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LIFE HISTORY CORRELATES OF AGE CHANGES IN MENTAL ABILITIES.

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AN EXPLORATION OF THE RELATIONSHIP BETWEEN AN INDIVIDUAL'S PATTERN OF LIVING AND THE RETENTION OF MENTAL ABILITIES WITH AGE WAS MADE AND EVALUATED. THE OBJECTIVES WERE (1) TO ESTIMATE THE EFFECTS OF AN 11-YEAR INCREMENT (50-61) UPON EIGHT MEASURABLE MENTAL ABILITIES, (2) TO ESTIMATE THE EFFECT OF THE GIVEN AGE INCREMENT UPON INDIVIDUAL AND TRAIT DIFFERENCES IN THESE PARTICULAR MENTAL ABILITIES, AND (3) TO REVEAL, VIA THE SCORED LIFE HISTORY, PATTERNS OF LIVING WHICH ARE TYPICAL OF THOSE WHOSE MENTAL ABILITIES AGE HAS TREATED MORE OR LESS KINDLY. NINETY-SIX SUBJECTS WHO HAD BEEN GIVEN THE ARMY ALPHA EXAMINATION IN 1919 AND 1950 WERE RETESTED IN 1961. IN ADDITION, THEY WERE GIVEN A 228-ITEM "LIFE EXPECTANCY INVENTORY." THE AVERAGE AGE OF THE SUBJECTS WAS 19 YEARS IN 1919. THE SUBTESTS OF ALPHA WERE COMBINED INTO THREE COMPONENTS--VERBAL, NUMERICAL, AND REASONING. THE RESULTS WERE CLASSIFIED IN TWO WAYS--(1) THOSE INVOLVING MENTAL ABILITY AND (2) THOSE INVOLVING THE LIFE HISTORY CORRELATES OF CHANGES IN MENTAL ABILITY. FINDINGS INDICATE THAT THERE WERE NO SIGNIFICANT CHANGES IN SUBTEST SCORES OR TOTAL SCORE FROM AGE 50 TO AGE 61. THERE WAS, HOWEVER, A SIGNIFICANT DECLINE ON THE NUMERICAL COMPONENT. IN ADDITION, THERE WERE NO SIGNIFICANT CHANGES IN THE MAGNITUDES OF EITHER INDIVIDUAL DIFFERENCES OR TRAIT DIFFERENCES FROM AGE 50 TO 61. (HB)

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COOPERATIVE RESEARCH PROJECT NO. 1052

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1963

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INTRODUCTION

According to Donahue and Tibbetts (1960) there are now almost 50 million people in the United States who are over 50 years of age. The ramifications of this fact go far beyond the scope of the present report. Some of them, however, are clearly psychological, and among these no issue looms larger than one regarding the affects of increasing age upon mental abilities.

Up until the early 1950's all the evidence bearing upon this important question had been derived from cross-sectional studies. These were in accord in indicating that a decline began at about age 20 and that by age 55 the loss might approximate one-half sigma (Jones & Kaplan, 1945).

However, just past midcentury longitudinal studies begin to appear which just as universally suggested that the course of intelligence with aging is not downward but upward (Bentz, 1953; Owens, 1953; Bayley & Oden, 1955; Nisbet, 1957). Charles' (1953) findings imply that this is as true at low as at high ability levels, and Nisbet's (1957) results make it clear that the phenomenon is not one of a large gain during the college years followed by a subsequent gradual decline.

Whereas, as Birren (1959) says, the longitudinal method is clearly the basic method in this context, even its most enthusiastic proponents would grant that intelligence does, no doubt, begin to decline at some age if one lives long enough. The question is *when*, and since no other longitudinal study has utilized subjects of as great mean age as the present one, one purpose of this investigation was to find out if the inevitable decline might begin during the decade from 50 to 60.

Causes of Change

If *what* happens to intelligence with age is a matter for disagreement, the *why* is much less clear and the evidence scarcer. One may choose Nature, Nurture, or Interaction with impunity because of the paucity of research.

If Goodenough and Maurer's (1942) assumption of a predetermined rate of intellectual development seems reasonable, it is easy to extrapolate this to assumptions about genetically predetermined decline. Some of Kallmann's (1959) studies of senescent twins would confirm the soundness of this point of view.

On the other hand, the current work of Hebb and others (1961) in early deprivation might be interpreted to suggest that adult intelligence could vary with the quantity and quality of past experience.

In a book advancing this thesis, Hunt (1961) examines five of Piaget's themes concerning the development of intelligence and concludes ". . .it is no longer unreasonable to consider that it might be feasible to discover ways to govern the encounters that children have with their environments, especially during the early years of their development, to achieve a substantially higher adult level of intellectual capacity" (Hunt, 1961, p. 363). From this point it is only a short extrapolation to an assumption of abilities maintained or lost through the nature of continuing quality and quantity of experience in adult and later life.

Following from Hunt's hypothesis, a second focus of the present study was upon some of the possible antecedents or whys of intellectual change. Specifically, it was desired to relate the pattern of such variables as health, education, vocation, hobbies, attitudes, recreational activities, and family background to parallel changes in performance on a mental abilities test.

In order to accomplish this it was necessary to develop or utilize some method which permits of the sampling of demographic and experiential data from a contemporary point in time. Among various possibilities, the use of a scored life history form particularly recommended itself and was adopted. For present purposes such a device may be defined as follows:

The life history inventory, sometimes referred to as a biographical or life experience inventory, is typically a questionnaire composed of multiple choice items which permit the individual to describe himself in terms of demographic or experiential variables presumed or demonstrated to be related to personality structure, personality adjustment, or success in social, educational, or occupational pursuits. The items usually stress fact rather than attitudes or feelings, although the latter are not excluded.

Background of the Present Study

The previously mentioned study by Owens (1953) forms not only the background of the present investigation but an integral part of it. The test used in this prior longitudinal study of mental abilities was the Army Alpha Examination. In essence, the method employed involved the retesting in 1950 of 127 males to whom the Alpha had been administered as an entrance test at the Iowa State University in 1919. The mean age of the subjects was 19 years at initial testing and 50 years at the retesting in 1950. The second testing revealed significant increases in score on the Practical Judgment, Synonym-Antonym, Disarranged Sentences, Information, and Analogies subtests, as well as on the Total score. There were insignificant changes on the three remaining subtests: Following Directions, Arithmetical Problems, and Number Series Completion. There was no significant decrease in score on any subtest.

In addition to measuring shifts in level of score over the 30-year period, Owens (1953) also compared 1919 with 1950 subtest and total variances (individual differences), and the variability among subtest scores for each individual (trait differences). He found that the latter remained remarkably constant. Individual differences, on the other hand, decreased significantly in the Disarranged Sentences subtest and increased significantly in the Analogies subtest; there was a marginally significant increase on the Total score. A brief personal information sheet was also administered to the group in 1950 with the result that enough personal-social correlates of shifts in scores were identified to suggest that the life history approach deserved further application to the task of attempting to explain age changes in mental abilities.

The present investigation, then, is essentially an extension and elaboration of this prior study. It is designed, however, particularly to fulfill two needs in the realm of research on age and mental abilities. First, it involves application of the longitudinal method to subjects over 50 years of age; and, second it involves an attempt not only to describe age changes in mental abilities, but to at least partially explain them as well.

Purposes of the Study

Specifically the purposes of the study are as follows:

(1) To estimate the effects of an 11-year age increment (50 - 61) upon eight measurable mental abilities;

(2) To estimate the affect of the given age increment upon individual differences and trait differences in these particular mental abilities; and,

(3) To reveal, via the scored life history, patterns of living which are typical of those whose mental abilities age has treated more kindly and less kindly.

PROCEDURE

Overview

During 1961 the Army Alpha examination was administered to 96 males who had taken the same examination as freshmen at Iowa State College in 1919 and again in 1950. Shifts in mental abilities from ages 50 to 61 were determined by measuring the 1950 to 1961 shifts in Army Alpha scores. Shifts in individual differences and trait differences for the same period were also determined.

An effort was made to explain the shifts in mental abilities for both the 1919 to 1950 period and the 1950 to 1961 period by constructing and administering to the subjects an extensive life history questionnaire, called the Life Experience Inventory (L.E.I.). Life experience correlates of age shifts in mental abilities were determined by item analyzing the inventory using the Alpha component (Verbal [V], Numerical [N], and Reasoning [R]) difference scores and the Total difference score from 1919 to 1950 and from 1950 to 1961 as the criteria.

Subjects

The subjects consisted of 96 males who were tested as entering freshmen at the Iowa State College in 1919, retested in 1950, and retested again in 1961. Their mean age was, thus, 19 years in 1919, 50 in 1950, and 61 in 1961.

Further description of the subjects may best be accomplished by a partial listing of their characteristics. Most typically they were from a rural area or a small village prior to college, but have since moved to the city; they graduated from college; their college major was agriculture or engineering; they were married with one or more children; they owned their own home or apartment; and their reported income for 1960 was between seven and thirteen thousand dollars.

The subjects were located throughout the United States with the greatest concentration in the Middle West. A great many occupational fields were represented, ranging from farmer to physician, with the majority toward the higher end of the occupational hierarchy.

Measuring Instruments

The study utilized two measuring instruments, the Army Alpha, Form 6, and the "Life Experience Inventory."

Army Alpha.

The Alpha was built in 1916 by a group including Bingham, Terman, Yerkes, and Otis in order to classify Army inductees with respect to intelligence. It contains eight separately timed subtests.

1. Following Directions
2. Arithmetical Problems

3. Practical Judgment
4. Synonym-Antonym
5. Disarranged Sentences
6. Number Series Completion
7. Analogies
8. Information

Table 1 gives an example of the type of item found in each of the respective subtests.

The total administration time for all eight subtests is approximately 30 minutes.

Life Experience Inventory. A copy of the "Life Experience Inventory" can be found in Appendix A. The inventory contained a total of 228 items of which 113 were classified as noncontinuous and 115 as continuous. Table 2 gives a complete breakdown of the inventory on the basis of item form.

The items were drawn from a large catalog of approximately 1000 items accumulated by the Principal Investigator on this project. Many of the items had been tried in previous studies and had proven to be effective predictors.

A further criterion for inclusion was whether the items could be sorted into broad, rational categories which the researchers felt were representative of areas of life history likely to be relevant to intellectual change. The items were subsumed under the following labels.

1. Health
2. Job Satisfaction

Table 1

Alpha Subtests and Representative Items

Subtest	Item
1. Following Directions	"Make a figure 1 in the first circle and also a cross in the third circle."[a] ○○○○○
2. Arithmetical Problems	If you walk 4 miles an hour for 3 hours, how far do you walk? ________
3. Practical Judgment	A house is better than a tent, because ☐ it costs more ☐ it is more comfortable ☐ it is made of wood
4. Synonym-Antonym	good - bad same - opposite
5. Disarranged Sentences	a eats cow grass true-false
6. Number Series Completion	2 4 6 8 10 12 __ __
7. Analogies	sky-blue: grass-table big warm green
8. Information	People hear with their: eyes ears nose mouth

---

[a] Directions for the items in subtest 1 are given orally and separately for each item.

Table 2

Classification of Life History Items by Item Form

Item Form		N
Noncontinuous		113
"Yes - No" response	18	
Multiple choice - multiple check	16	
Multiple choice - single check	75	
"Fill-in" response	4	
Continuous		115
Multiple choice - single check	103	
"Fill-in" response	12	
Total		228

3. Community Surroundings
4. Education
5. Home Surroundings
6. External Interests
7. Self Evaluation of Skills
8. Religion
9. Values and Philosophy of Life
10. Hobbies and Recreational Activities
11. Self-Description
12. Feelings Regarding Retirement
13. Classification

These categories were well represented by both continuous and noncontinuous items.

Administration

All subjects were invited to attend a class reunion and banquet which was held in conjunction with the project. Of the total of 96, 28 subjects attended this reunion. Their room and board were provided and they were given a token payment of five dollars for their participation in the project.

The subjects who failed to attend the reunion were retested by examiners resident in their vicinity. These subjects received 10 dollars for participation. The examiners received 10 dollars plus travel expenses for their services; the great majority of them were members of the American Psychological Association and all were competent to administer group tests.

In order to insure minimum variation in administration, examiners were given detailed procedural instructions concerning both the Alpha and the "Life Experience Inventory." These instructions are reproduced in Appendix B.

Criteria

In general, the criteria were differences in Alpha scores between 1919 and 1950 and between 1950 and 1961.

In order to establish comparable units of measurement and a stable referent for the evaluation of shifts in subtest and total scores, all test scores were put in standard score form. The standard scores were based on the same norm group used in the earlier study by Owens (1953) and consisted of scores for 1000 male Iowa State College freshmen of 1923-1924. This group had taken the Alpha as an entrance test under conditions similar to those which obtained for the experimental subjects. With all scores transformed in this manner, it was possible to obtain comparable differences between standard scores for the eight subtests and the total and for the two time periods.

Individual differences.

The effects of the 11-year period, 1950 to 1961, upon the magnitude of individual differences and trait differences were determined by using the same techniques employed by Owens (1953). The individual differences problem was attacked by finding 1950 variances, based on standard scores, for each subtest and the total score. Comparable variances were computed for the 1961 testing period. A test for the significance of the difference between correlated variances was then made in the fashion described jointly by Pitman (1939) and Morgan (1939).

Trait differences. Changes in trait differences over the 11-year period were determined by computing a "V" score for each individual at each testing period. The "V" score is the variance of an individual's standard scores on the eight subtests about his own mean for the given testing period. A distribution of the differences between the 1950 and the 1961 "V" scores was obtained and its mean tested for the significance of its departure from that of a distribution with mean zero.

Components. In order to reduce the number of criterion variables and to facilitate generalization of results, the Alpha subtests were combined into three components--Verbal, Numerical, and Reasoning. These components were derived from Guilford's (1954) factorial analysis of the Army Alpha examination. He found the tests loading most highly on the indicated factors to be as follows.

Verbal Factor

# 3, Practical Judgment
# 4, Synonym-Antonym
# 5, Disarranged Sentences
# 8, Information

Numerical Factor

# 2, Arithmetical Problems

# 6, Number Series Completion

Reasoning Factor

# 1, Following Directions

# 7, Analogies

Guilford then used the multiple-regression method to weight the subtests in order to maximize their multiple correlation with the factor on which they exhibited their highest loadings.

Since Guilford's weights were based on raw scores, it was necessary to multiply them by the subtest standard deviations of the Iowa State norm group in order to obtain the effective weights which could then be applied to the standard scores used in the present study. The minimum weight within all factors was made equal to unity, while keeping the ratio of weights within any one factor constant. Table 3 shows the actual numbers used in this transformation and the final effective weights.

Thus, the specific criteria used in the present study were the difference scores for the three components and Total score over the two time periods--1919 to 1950 and 1950 to 1961.

Reliability. The reliability of the total Alpha score has generally been regarded as satisfactory; Jones and Conrad (1933) give it as 0.977. Owens, in his earlier study,

Table 3

Alpha Subtest Weights for Measuring Factors V, N, and R, and Correlations of Weighted Composites with the Factors

Factor	Sub-tests	Guilford's Raw Score Weights	Multiple r with Factor	Norm Group S.D.'s	Unad-justed Effec-tive Weights	Adjusted Effec-tive Weights
V	3	.517	.854	4.0	2.068	1.0
	4	.687		7.0	4.809	2.3
	5	.667		5.5	3.668	1.8
	8	.359		9.5	3.410	1.6
N	2	2.780	.816	2.5	6.950	3.6
	6	.553		3.5	1.936	1.0
R	1	1.005	.816	2.2	2.211	1.0
	7	.831		12.0	9.972	4.5

estimated the reliability of subtests and total score in three ways, meanwhile recognizing that none of them was completely satisfactory.

He first computed corrected odd-even reliability coefficients based upon the results of his 1950 retesting. The assumption that the test is essentially unspeeded was violated in this analysis. For comparative purposes, Owens used a method suggested by Gulliksen (1950) to estimate the lower limit values of odd-even reliability coefficients obtained from slightly speeded power tests.

The third method used to estimate these same reliabilities was to compute the test-retest correlation for each subtest and the total score over the 30-year interval between the two testings. This method, of course, furnished underestimates of the true values in question to the extent that the functions measured had fluctuated differentially within the individuals over time.

Table 4 contains these prior results (1953, p. 12) concerning the corrected odd-even reliability coefficients, the estimated lower limits, and the test-retest coefficients. It was Owens' opinion that "It thus may be observed with considerable confidence that the desired true reliabilities almost certainly lie somewhere between the indicated odd-even overestimates on the one hand, and the lower limit values and test-retest coefficients on the other" (1953, p. 13).

Table 4

Estimates of the Reliability of Subtest
and Total Alpha Scores

Subtest	Odd-even	Test-retest	Lower Limits
1	0.49	0.30	
2	0.77	0.69	0.17
3	0.93	0.56	0.46
4	0.93	0.64	0.63
5	0.87	0.48	0.62
6	0.76	0.62	0.20
7	0.96	0.56	0.84
8	0.73	0.63	0.69
Total	0.97	0.77	

Note.--Reprinted from Owens' monograph (1953, p. 12).

For the purposes of the present investigation, it was felt that information regarding the reliabilities of the subtests and total score should be supplemented with information relating directly to the reliabilities of the difference scores themselves. The Verbal component was chosen for the analysis because it is relatively less speeded than the other two components. The problem of reliability was then approached in two ways.

The first reliability estimate derived from a split-halves analysis. The factor loadings of subtests in the two halves were approximately matched, with the result that the difference scores for subtest 3 plus subtest 5 were correlated with the difference scores for subtest 4 plus subtest 8. Pearson product-moment correlation coefficients were computed for both time periods, 1919 to 1950 and 1950 to 1961, and corrected for length through application of the Spearman-Brown formula.

The second reliability estimate, perhaps better termed a consistency estimate, was an analysis of the comparability of two different methods of computing difference scores. One method, the one used in the present study, involved a simple difference score obtained by subtracting the 1919 component score from the 1950 component score and the 1950 component score from the 1961 component score. The other method, perhaps most appropriately termed a "relative" difference score, consisted of dividing the simple difference by the first of the two scores from which the difference score had been derived. For example, a 1919 component score would be subtracted from a 1950 component score and the difference divided by the 1919 component score. The resulting "relative" difference score presumably takes into account the initial level at which the individual is operating. The comparability of these two methods was appraised by obtaining a product moment correlation between the resulting simple and "relative" difference scores.

Item Analysis of Life History Items

Using the several component difference scores as criteria, the 228 life history items were analyzed to determine which ones were correlated with shifts in mental abilities. Two procedures were used in this analysis, one for the continuous items and one for the noncontinuous.[1] The noncontinuous items were analyzed alternative by alternative as dichotomous variables, either checked or unchecked. The criteria were also dichotomous, the 48 individuals whose difference scores showed the greatest increase or least decrease on a particular criterion served as the high group for that criterion. The 48 individuals with the greatest decrease or least increase on the same criterion served as the low group for that particular criterion. For each option, the binomial test of significance was applied

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[1] Items in which the options either lay along some continuum or were discreet.

(Siegel, 1956). The null hypothesis for this test is that the difference between two observed sample frequencies could have arisen by chance in a two class population where P is .50. The exact probabilities of H_o being true were obtained from extensive tables of the cumulative binomial probability distribution tabulated by the Harvard University Computation Laboratory (1955). Options containing a frequency of five or less responses or more than 91 responses were dropped from consideration as probably either unreliable or as descriptive rather than discriminating. This reduced the 113 noncontinuous items with a total of 557 options to 108 items with a total of 430 options.

The 115 continuous items were analyzed by computing a product-moment correlation between the criterion score and the life history item score (determined by the item option selected). Each item was correlated with all eight criterion variables and items were eliminated which failed to correlate with more than one criterion variable at the .20 level. In all, 33 items were eliminated, leaving 82 significant continuous items.

Factor Analysis

A decision was made to use only continuous life history items in a factor analysis for the following reasons:

1. The percentage of continuous items which were significantly related to the criteria was considerably higher

than the percentage of noncontinuous alternatives. In fact, the percentage of the latter found significant was not appreciably different from a chance expectation.

2. All the rational categories were well represented by continuous items. The continuous items, therefore, were representative of the "Life Experience Inventory," en toto.

3. The very small number of persons checking certain alternatives and the problem of unequal n's made the noncontinuous items less amenable to statistical treatment.

Procedures. The subjects' responses to the 82 continuous life history items and their difference scores on the eight criterion variables were punched into IBM cards and constituted the machine imput. The intercorrelations, factor analysis, and rotations were performed on an IBM 7090, programed to compute sums, sums of squares, and correlations, estimate communalities, derive factors, rotate the factors, and print out all results.

Intercorrelations between the 90 variables were computed and estimates of the communalities were made by the image-covariance method which yields "essentially a multiple correlation coefficient with adjustment of the off diagonal elements. . ." (Factor Analysis Package, 1962, p. 1).

Twenty factors were extracted by the principle factor method (Harmon, 1960) and the latent roots for the 20 factors were plotted (Fig. 1). The point of inflection on the curve appeared at five factors. It should be noted, however,

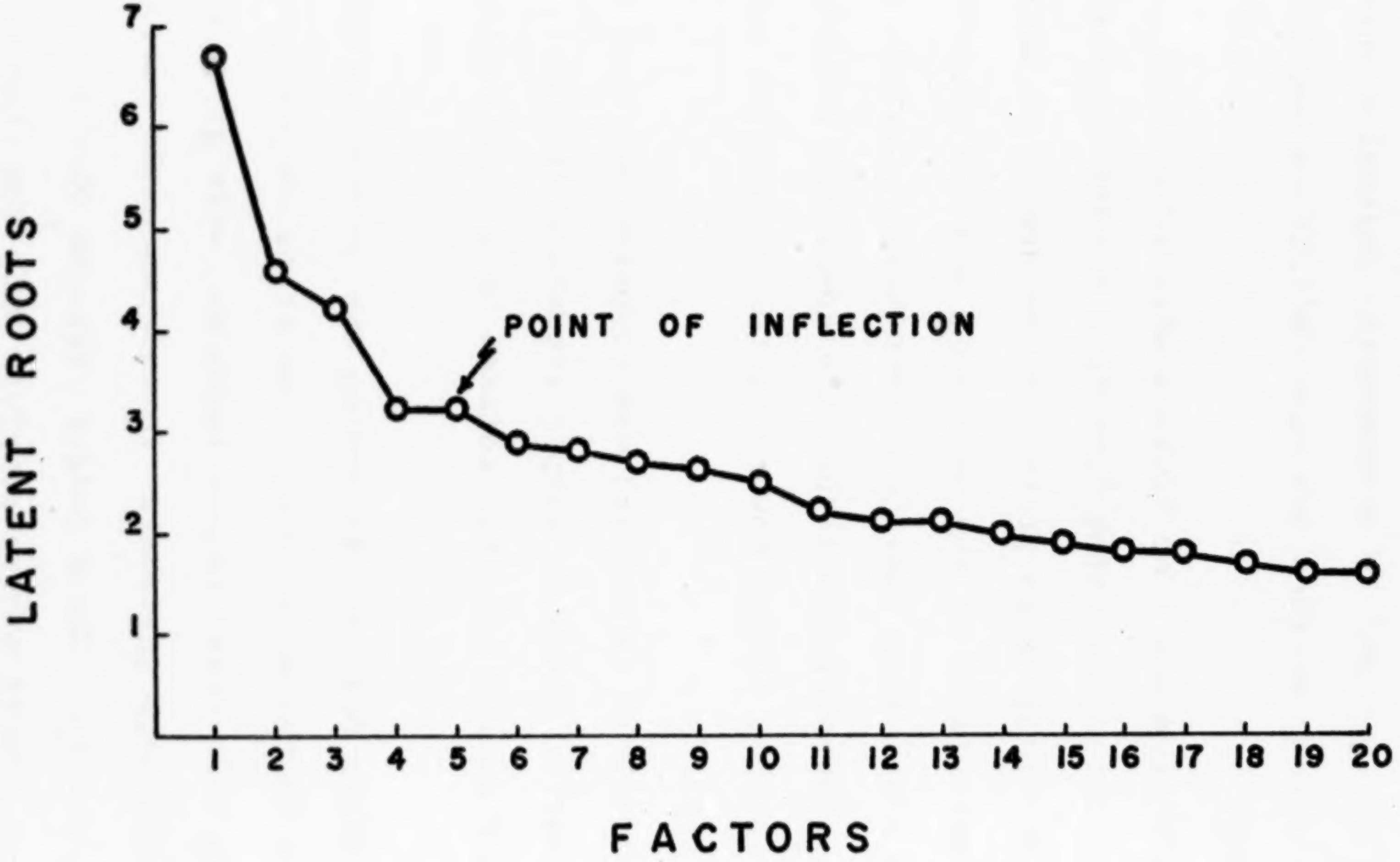

Fig. 1. Latent roots for 20 factors prior to rotation.

that the latent roots are substantial through approximately nine factors. It was, therefore, decided that the most thorough procedure would be to independently rotate both five and nine factors and to subsequently determine which of the two rotations yielded the most definitive and interpretable results.

Thus, both five and nine factors were rotated to oblique simple structure using Carroll's (1957) biquartimin criterion. The biquartimin criterion, according to Carroll, combines the advantages of the quartimin and the covarimin methods while minimizing their disadvantages. Carroll found from empirical investigations that the covarimin procedure is almost invariably biased toward factor axes which are too highly correlated.

A Landahl matrix (T matrix) was computed and used for an initial rotation close to simple structure (Landahl, 1938) and the F matrix was then rotated to a simple structure solution.

The procedure followed in naming the factors is somewhat unique in factorial studies. The items composing the factors, along with their factor loadings, were given to eight judges who were instructed to independently assign names to the factors. Three judges received only the five factor rotation, three others received only the nine factor rotation, and the remaining two received both the five and the nine factor rotations. The majority of judges received only one of the two rotations in order to minimize the possibility of the naming of one rotation unduely influencing the subsequent naming of the other. The judges were composed of one professor and seven graduate students in psychology. All judges were, in some degree, familiar with factor analytic procedures. Thus, the final names given to the factors were determined largely by the extent of agreement between judges.

RESULTS

Reliability of Criteria

The split-halves reliability estimate of the 1950 minus 1919 difference scores on the Verbal component was 0.365. The parallel analysis for the 1961 minus 1950 time period yielded a reliability estimate of 0.507.

The magnitude of these reliability coefficients is reasonably satisfactory, if it is considered (1) that difference scores are notoriously unreliable, (2) that the time intervals involved are atypically great, and (3) that interest centers on group differences. The fact that the scores for the later time period are somewhat more reliable than those for the earlier can be accounted for, at least in part, by the shorter time span of the later period. In view of the pattern of gains subsequently revealed, and the size of the temporal interval itself, the period between 1950 and 1961 was clearly less likely to be affected by differential fluctuation of the function within the individual than was the longer period between 1919 and 1950.

The comparison of the two approaches to computing difference scores, the simple and the "relative" methods, showed the two procedures to give essentially the same results. The correlation between the simple and "relative" Verbal difference scores for the 1919 to 1950 time period was .999. The corresponding correlation for the later time period was .995. Thus, we may safely conclude that individuals would maintain their same relative positions within the group irrespective of the nature of the difference score utilized. Given this option, the simple difference score was chosen for use.

Alpha Results

Prior to computing age shifts in Alpha scores, a comparison was made between the scores of those who were given the test individually and those to whom it was administered as a group. This comparison was made to determine whether results from the two conditions of administration could be combined for analysis. Table 5 contains the evidence; it is indicated that the scores of the 28 persons tested as a group at the Reunion Banquet did not differ significantly from those of the 68 subjects to whom the test was given individually. The assumed homogeneity of variance between the individual and group administrations was tested by application of Snedecor's F test which indicated homogeneity for all subtests and the total. On this basis the scores from the two types of administrations were combined.

The findings regarding the effect of the 11-year increment on the subtest scores and total score appear in Table 6. The column headed $\bar{X}_{1961}$-$\bar{X}_{1950}$ contains the differences between

Table 5

Individual vs. Group Administration of the Alpha (1961)

Subtest	$\overline{X}_I$	$\overline{X}_G$	t[a]	F[a]
1. Following Directions	5.20	5.53	1.18	1.26
2. Arithmetical Problems	5.50	5.69	.71	1.11
3. Practical Judgment	6.54	6.66	.47	1.16
4. Synonym-Antonym	5.80	5.87	.18	1.21
5. Disarranged Sentences	5.76	6.02	.28	1.05
6. Number Series Completion	5.60	5.68	.30	1.12
7. Analogies	5.76	5.95	.72	1.01
8. Information	6.41	6.40	.04	1.06
Total	6.20	6.40	.22	1.34
	n = 68	n = 28		

Norm Mean = 5; Standard Deviation = 1.

[a] None of these values is significant.

Table 6

Temporal Shifts in Subtest and Total Alpha Scores

Subtest	$\bar{X}_{1961}-\bar{X}_{1950}$	t	P
1. Following Directions	.011	.012	>.05
2. Arithmetical Problems	-.237	-.436	>.05
3. Practical Judgment	-.118	-.192	>.05
4. Synonym-Antonym	-.049	-.072	>.05
5. Disarranged Sentences	-.036	-.052	>.05
6. Number Series Completion	-.084	-.116	>.05
7. Analogies	.013	.025	>.05
8. Information	.043	.089	>.05
Total	-.047	-.138	>.05

Norm Mean = 5; Standard Deviation = 1.

the 1961 mean scores and 1950 mean scores in units of the norm standard deviation. Scores on five of the eight subtests and the total declined insignificantly. This analysis indicates that the improvement in test performance exhibited by the subjects between ages 19 and 50 leveled off between ages 50 and 61. Table 35, Appendix C, contains the parallel subtest and total score shifts from 1919 to 1950 for the 127 individuals tested in 1950.

Changes in component scores over the same 11-year period appear in Table 7. Scores on the Reasoning component remained amazingly constant; scores on the Verbal component showed an apparent but statistically insignificant decline; and scores on the Numerical component showed a significant decline of the order of magnitude of about one-fifth of a sigma unit. Corresponding data for the 1919 to 1950 period, and for the sample of 96, appear in Table 36, Appendix C.

The trends in performance for the subtests of the Verbal component are presented in Fig. 2. Fig. 3 and 4 contain corresponding data for the subtests of the reasoning and numerical components, respectively. The "curves" of Fig. 5 represent mean test performances on each component and the total over time.

Table 8 contains the results relating to the effect of the 11-year increment on individual differences; there were no significant changes over this period. Comparing these findings with corresponding results for the 127 subjects of

Table 7

Temporal Shifts in Component Alpha Scores

Component	$\bar{X}_{1961}-\bar{X}_{1950}$	t
Verbal	-.032	-.90
Numerical	-.203	-4.38**
Reasoning	.015	.28

Norm Mean = 5, Standard Deviation = 1.

**p < .01

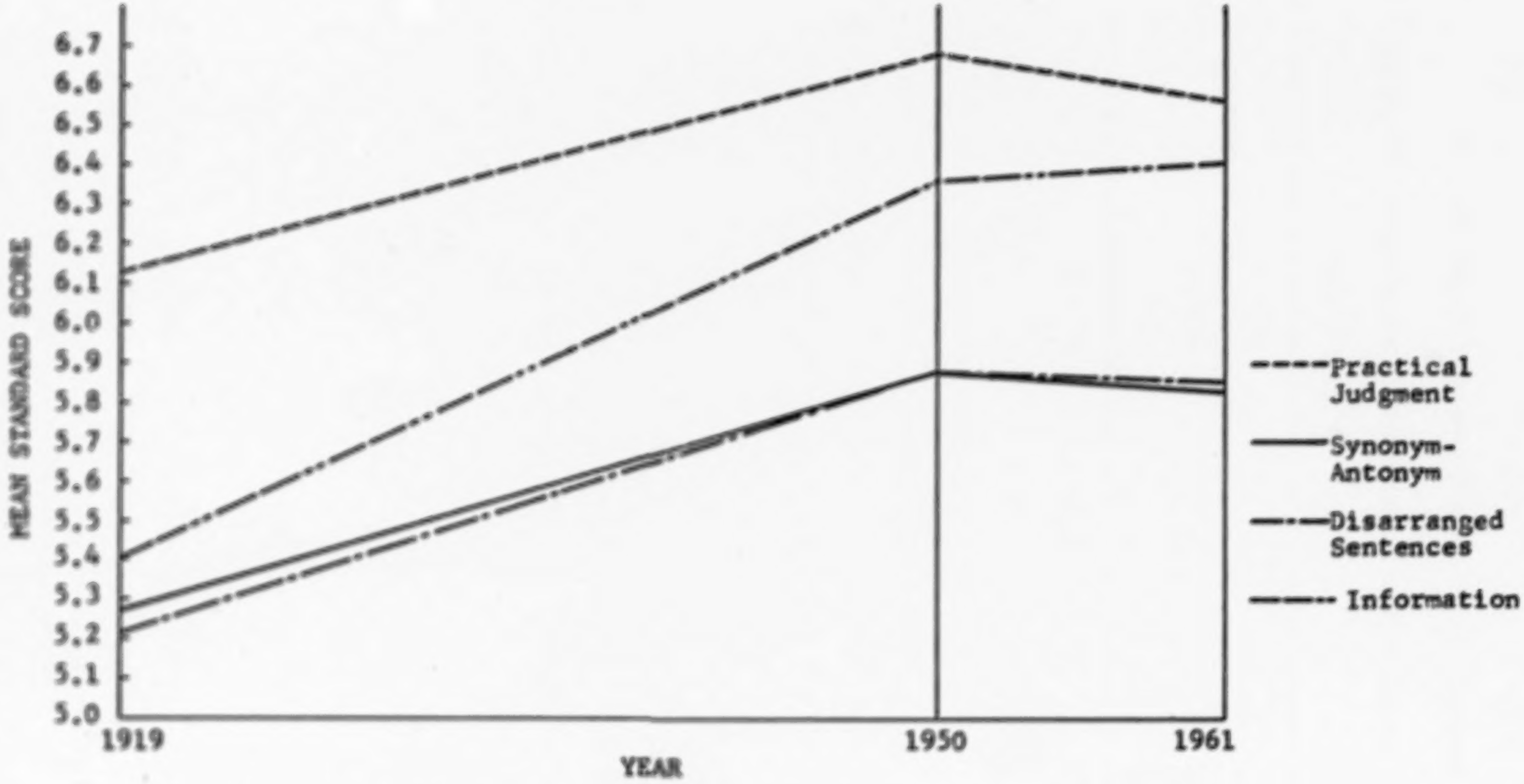

Fig. 2. Test performance trends for subtests of the verbal component.

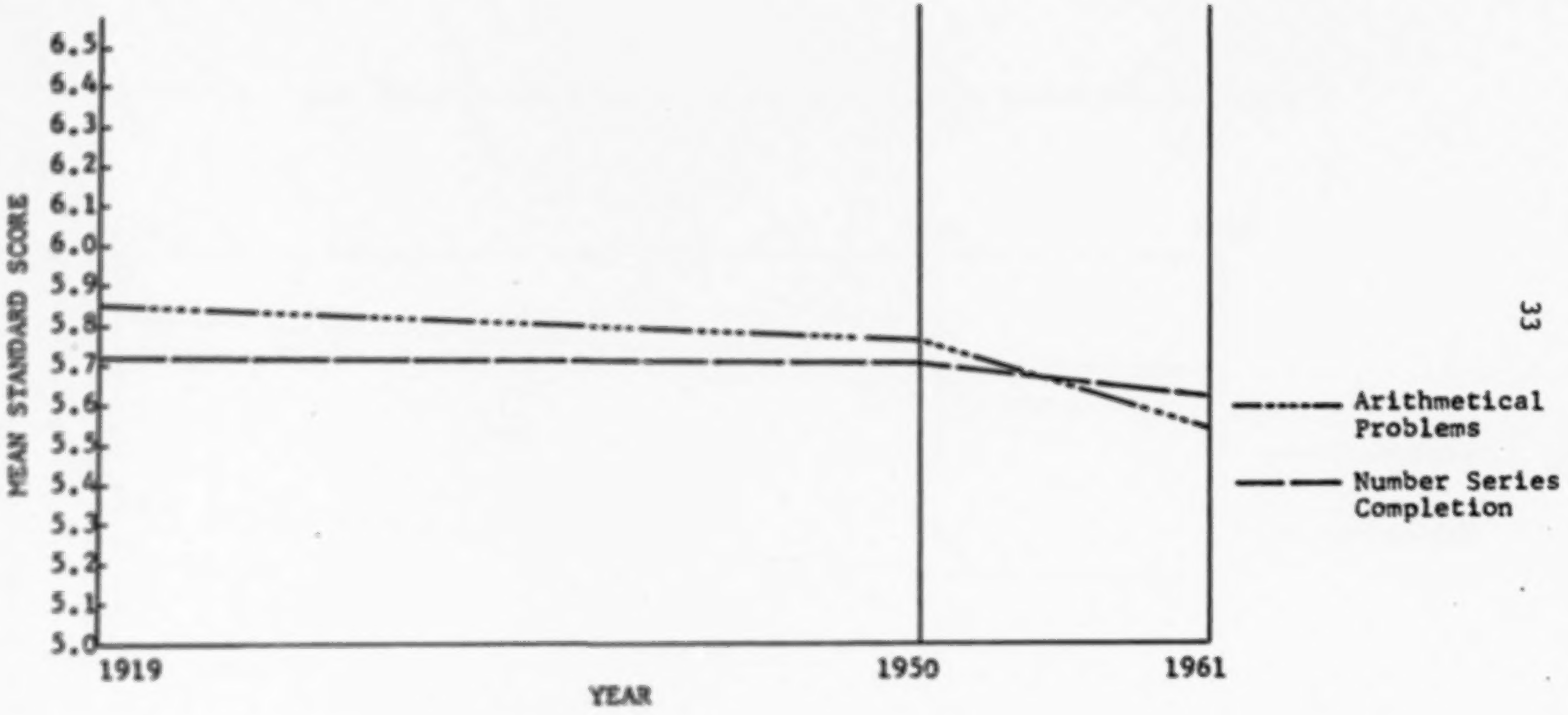

Fig. 3. Test performance trends for subtests of the numerical component.

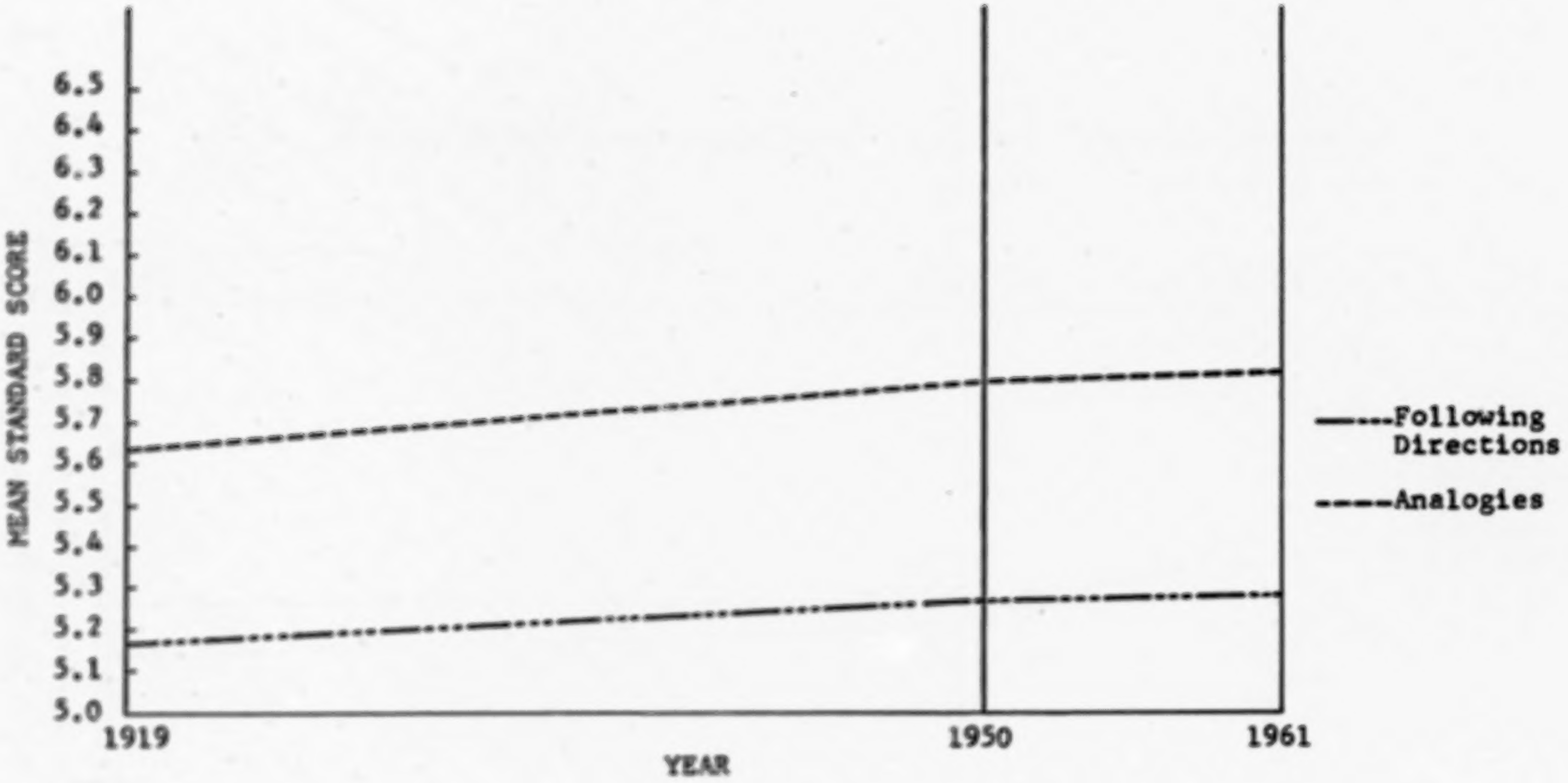

Fig. 4. Test performance trends for subtests of the reasoning component.

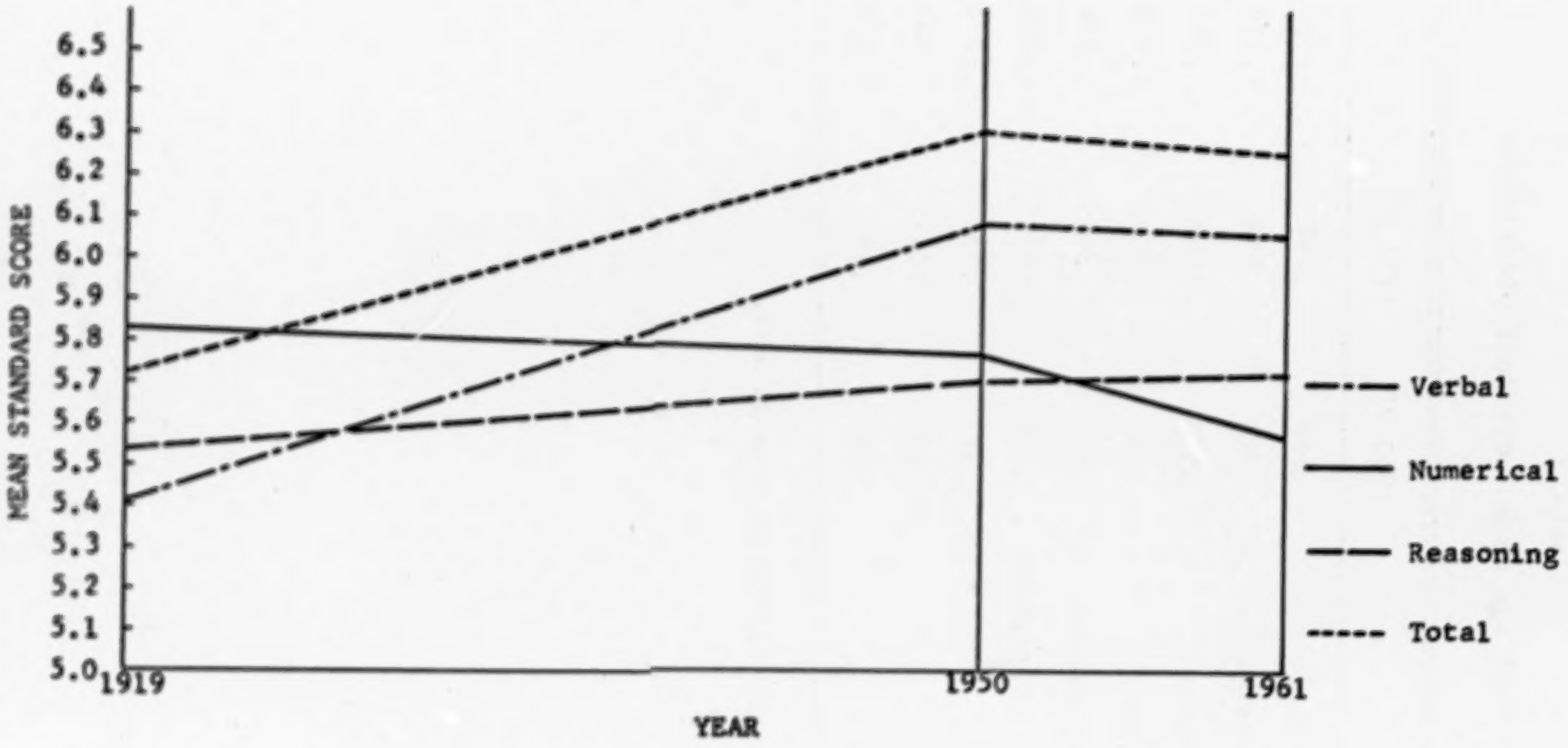

Fig. 5. Test performance trends for components and total.

Table 8

The Effects of Age upon Individual Differences

Subtest	1950 σ^2	1961 σ^2	t[a]
1. Following Directions	.860	.742	-.805
2. Arithmetical Problems	.928	.778	-1.538
3. Practical Judgment	.578	.609	.347
4. Synonym-Antonym	.683	.900	1.908
5. Disarranged Sentences	.656	.844	1.694
6. Number Series Completion	.701	.650	-.464
7. Analogies	.812	.682	-1.508
8. Information	.425	.517	1.444
Total Scores	.700	.767	1.138

[a] None of these values is significant.

the earlier study (Table 37, Appendix C) reveals that during both periods the variance of the scores on subtest 6 decreased while it increased on the total. The 1950 to 1961 shifts in variance on the other seven subtests were reversed in direction from corresponding 1919 to 1950 shifts.

The affects of the 11-year age increment upon trait differences is summarized in Table 9. As was the case with the 127 subjects from 1919 to 1950 (Table 38, Appendix C), there was no significant change in trait differences from 1950 to 1961. The figures under "Range" in Table 9 represent the span from the largest individual increase to the largest individual decrease; those under N indicate that 52 persons showed an apparent increase in trait differences while 44 showed an apparent decrease. It appears that trait differences have remained very constant.

Life Experience Inventory Results

From the total of 430 response options to the noncontinuous life history items, only 82 were found to be significant on one or more of the eight criteria. As noted previously, "significant items" were those which surpassed the .20 level on two or more criteria or the .10 level on one criterion. The probability that this number of items could appear to be significant by "chance" alone is 0.68 (Brozek & Tiede, 1952). Thus, overall, the options are not defensible as life experience correlates because of the high probability that many of them are chance occurrences. Accordingly, they

Table 9

The Effects of Age upon Trait Differences

Subtests	$\Sigma(\sigma^2_{1961}-\sigma^2_{1950})$	Range	$N\pm$	t	P
1 through 8	-3.2278	+1.856 -2.8870	+52 -44	-.602	>.05

σ^2_{1961} = the variance of the individual's subtest scores in 1961.

Range = greatest individual increase and decrease in standard deviation units.

$N\pm$ = number of cases showing an increase or decrease.

are ignored in what follows, with the exception that those with $P \leq .05$ on one or more of the criteria are listed in Appendix D in the hope that they may provide some speculative hypotheses for further research.

The continuous items were tested for significance by correlating the individual's item score with his Alpha component difference scores or total difference score. The requirements for significance were the same as those employed with the noncontinuous items. If the assumption is made that the criteria are completely dependent so that there is, in effect, only one criterion, then there were 82 significant items from a possible total of 115. The probability that this many items would discriminate by chance is far less than .0001. However, the criterion intercorrelations contained in Table 10 indicate that with the exception of the correlation between the three components and the Total, the criteria are relatively independent. Thus, a more realistic probability estimate may be obtained by multiplying the total number of items (115) by the number of criteria (8). This procedure results in a total of 920 possible item-criterion correlations. Summing the number of items significant on each of the eight criteria results in a total of 214 significant "synthetic items." The probability that 214 of 920 items, on the average discriminating at the 10% level, could be obtained by chance is still far less than .0001 and closely approximates zero. Since the criteria are

Table 10

Intercorrelations of the Criteria

	1	2	3	4	5	6	7	8
1. Verbal, 1950-1919[a]		-.16	.19	.76	-.23	.07	-.12	-.25
2. Numerical, 1950-1919			.18	.17	.24	-.47	-.16	-.04
3. Reasoning, 1950-1919				.71	.18	-.10	-.42	-.12
4. Total, 1950-1919					.01	-.12	-.35	-.25
5. Verbal, 1961-1950						.00	.01	.72
6. Numerical, 1961-1950							.21	.36
7. Reasoning, 1961-1950								.56
8. Total, 1961-1950								

[a] The "Verbal, 1950-1919" criterion is the mean shift in score between 1919 and 1950 on the verbal component.

not entirely independent, this procedure provides a conservative test. On the basis of it, this pool of 82 items was accepted as unlikely to be largely composed of chance discriminators.

The large difference in the proportion of continuous and noncontinuous items that were significant deserves a comment. These items are similar in content. The test of significance for the noncontinuous items, however, was not as powerful as the test for the continuous items. This is explained by the fact that, for the noncontinuous items, each option was considered as a separate item. This procedure resulted in a relatively small N for many of the options and therefore in a less powerful test of significance.

Since the observed number of discriminating noncontinuous items could be regarded as an event attributable to chance, the analyses of the Life Experience Inventory were limited solely to the continuous items. Table 11 contains the numbers of these items significant on each of the eight criteria. The last column contains Brozek and Tiede's chance probability estimates. With the exception of the numerical component, it was the 1919 to 1950 criterion segments which represented significant shifts in Alpha scores. As might be anticipated, and as Table 11 shows, it was these same criterion segments to which the largest numbers of life history items were significantly related.

Table 11

Number of Continuous Items Significant by Each Criterion

Criterion	Number Significant[a]	P
1. Verbal, 1950-1919	27	.176
2. Numerical, 1950-1919	32	.018
3. Reasoning, 1950-1919	27	.176
4. Total, 1950-1919	42	.000
5. Verbal, 1961-1950	21	.677
6. Numerical, 1961-1950	25	.322
7. Reasoning, 1961-1950	20	.754
8. Total, 1961-1950	20	.754

[a] Total N = 115.

A first method of summarizing the obtained life history data was to assign all discriminating items to one of seven rational categories. These categories were established on the basis of appropriateness to the apparent item content and congruence with reasonable hypotheses regarding the causes of age-ability shifts. The category labels employed follow.

1. Early Experiences
2. Physical Fitness
3. Education
4. Occupational Endeavors
5. Adult Home and Community Life
6. Interests
7. Personal Characteristics

The number and percent of items significant, by category, for each time period is contained in Table 12. The correlates classed as "Early Experiences" appear in Table 13. The first column at the right contains the levels of significance of the correlations between the 1950 minus 1919 component differences (V, R, N, or T) and the item scores. Positive values indicate that the higher a particular criterion score, the higher the number of the item option selected. Column 3 of the table contains corresponding figures for the 1961 minus 1950 criteria. Decimal points are omitted.

Tables 14 through 19 contain the correlates and significance values for the six remaining rational categories.

Table 12

Number of Items Significant by Rational Category for Each Criterion Segment

Rational Category	Total Number of Items	1950-1919 Criterion Segment		1961-1950 Criterion Segment	
		N	%	N	%
Early Experiences	12	6	50	3	25
Physical Fitness	16	9	56	3	19
Education	9	6	67	3	33
Occupational Endeavors	23	16	70	13	57
Adult Home and Community Life	10	4	40	4	40
Interests	10	5	50	8	80
Personal Characteristics	35	18	51	20	57
Total Number	115	64	56	54	47

Table 13

Early Experience Correlates and Probabilities

Item	Probabilities 1919 to 1950	 1950 to 1961
9. As a youth, were you ever so upset by some tragedy that you brooded for some time over the meaning of life? 1. yes 2. I've been upset, but seldom brooded over it 3. no	-20 V -01 R -05 T	
38. Prior to going to college, you lived most of your life in: 1. a large city (over 500,000) 2. a city (20,000 to 500,000) 3. a town (1,000 to 20,000) 4. a village (less than 1,000) 5. a rural area	-10 N	
49. How much independence do you feel your parents allowed you while in high school? 1. very little 2. about as much as the rest of my friends 3. quite lenient, a good deal 4. as much as I wanted	05 N	-10 N
50. During most of the time until you were 21, or until you left home, did you live in a place in which: 1. I was well treated and happy 2. I was fairly well treated and satisfied 3. conditions were tolerable 4. conditions were somewhat unsatisfactory 5. I wanted to leave as soon as possible	10 V	
55. Using your own interpretation of what success means, do you feel your father was successful? 1. yes 2. partially or I am not sure 3. no	20 N 20 T	

(Table continued on next page)

Table 13 (Continued)

Early Experience Correlates and Probabilities

Item	Probabilities 1919 to 1950	Probabilities 1950 to 1961
56. As far as religion is concerned would you consider your parents during your childhood to have been: 1. very religious 2. moderately religious 3. only nominally religious 4. uncertain about the place of religion 5. anti-religious	10 N -10 R	-10 N
104. With how many brothers and sisters did you grow up? 1. total 0 or 1 2. total 2 3. total 3 4. total 4 or more		05 N

Table 14

Physical Fitness Correlates and Probabilities

Item	Probabilities 1919 to 1950	 1950 to 1961
1. What is your weight? 1. under 135 pounds 2. 136 to 155 pounds 3. 156 to 175 pounds 4. 176 to 195 pounds 5. over 195 pounds	-01 R -05 T	
6. How many times have you experienced major surgery? 1. 0 2. 1 3. 2 4. 3 5. 4 or more	-10 R	
10. On the average, how much sleep do you require to feel good? 1. less than 5 hours 2. 5 to 6½ hours 3. 6½ to 7 hours 4. 7 to 8 hours 5. more than 8 hours	-10 N	
11. During the last full calendar year, how often have you had to turn down, or break, a social engagement because you were tired? 1. never 2. rarely 3. occasionally 4. frequently		05 N
12. Does a typical day at work tire you out? 1. much more than the average person my age 2. somewhat more than the average person my age 3. somewhat less than the average person my age 4. much less than the average person my age	05 V 20 T	

(Table continued on next page)

Table 14 (Continued)

Physical Fitness Correlates and Probabilities

Item	Probabilities 1919 to 1950	 1950 to 1961
13. Do you tire more rapidly than you did 10 years ago? 1. yes, much more rapidly 2. yes, a little more rapidly 3. no, I don't notice any real difference	10 V 20 N 10 R 05 T	
14. Over the last 10 years, how would you characterize your physical vigor? 1. exceptional 2. good 3. average 4. poor 5. very poor	-05 N	
16. Has your health kept you out of activities or out of the company of people you think you would have enjoyed? 1. often 2. sometimes 3. rarely 4. never	10 N	
17. When you have a cold, do you usually 1. see a physician 2. stay home in bed 3. take home remedies 4. stay on the job, but take it easy 5. ignore it		10 R
35. Through your adult life, how tiring has your work been? 1. very tiring--exhausting 2. moderately tiring 3. I only occasionally felt tired 4. I never thought about being tired	10 N	-10 V
109. For how many days during the last full calendar year have your normal activities been suspended because of accident? 1. 0 2. 1 3. 2 4. 3 or more	-05 V -10 T	

2

Table 15

Education Correlates and Probabilities

	Probabilities	
Item	1919 to 1950	1950 to 1961
3. How long has it been since you have been exposed to any formal instruction? (short course, extension course, correspondence course, refresher course, et al.) 1. less than 1 year 2. less than 5 years 3. less than 10 years 4. not since college or more than 10 years	-05 V -10 R -05 T	
40. How far did you go in school? 1. took some college work, but didn't graduate 2. graduated from college 3. took some graduate work, but received no graduate degree 4. completed M.S. or M.A. 5. completed Ph.D.	20 N 20 T	20 V
41. To what extent did your college education contribute to your life goals? 1. it helped me markedly 2. I believe it helped me somewhat 3. I doubt that I would have done substantially differently if I had never attended college	-01 N	-20 V
42. How many times did you change your major in college? 1. never 2. once 3. twice 4. three or more times	10 V 20 R 05 T	
44. What proportion of your college expenses did you earn personally? 1. less than 1/10th 2. 1/10th to 1/4th 3. 1/4th to 1/2 4. 1/2 to 3/4ths 5. nearly all	20 V 10 N 20 T	

(Table continued on next page)

Table 15 (Continued)

Education Correlates and Probabilities

Item	Probabilities 1919 to 1950	 1950 to 1961
46. How much better could you have done in college, scholastically, than you actually did? 1. quite a bit better--I didn't apply myself 2. a little better--I was not too serious 3. not much better--I did about as well as my abilities permitted.	-20 V 05 N	-05 N

Table 16

Occupational Endeavors Correlates and Probabilities

Item	Probabilities 1919 to 1950	 1950 to 1961
19. In your work life, have you	-10 R	20 R
1. worked at the same job without much change since I left college	-10 T	
2. changed jobs occasionally, but stayed in the same occupation		
3. worked at one or two occupations most of the time (with or without occasional periods at some other activity)		
4. tried several different occupations		
20. By the time you finished high school, how did you feel toward your life's occupation?	05 V -20 N	-10 V -10 T
1. knew what I wanted in the way of a job and have not changed my mind		
2. thought I knew what I wanted but have since changed my mind		
3. had some idea of what I wanted to enter		
4. had little or no idea of what I wanted to enter because I was interested in many things		
5. had little or no idea what I wanted to enter because few things interested me		
21. Relative to the goals you had when you left college, your life's work?	-01 N -01 R	
1. has surpassed those goals	-10 T	
2. has fulfilled those goals		
3. has not been as good work as I had hoped for		
4. has been unrelated to my goals but satisfactory		
5. has been unrelated to my goals and unsatisfactory		

(Table continued on next page)

Table 16 (Continued)

Occupational Endeavors Correlates and Probabilities

	Probabilities	
Item	1919 to 1950	1950 to 1961
23. Your average length of service in all your previous full-time jobs was:	-10 T	
1. no previous jobs or less than one year		
2. one to two years		
3. three to four years		
4. five to six years		
5. seven to eight years		
6. nine to ten years		
7. more than 10 years		
24. Generally, in your work, would you prefer:	20 N	-05 R
1. to work at one thing at a time	10 R	-20 T
2. to work on two or three things at a time	20 T	
3. to have many things "on the fire" simultaneously		
26. If you could work on what you would consider an ideal job, you would:	-05 V -05 T	
1. work entirely autonomously		
2. work under only suggested priorities		
3. expect to be told what to do, but not how to do it		
4. expect to be told what to do and receive suggestions as to how to do it		
5. expect to be told what to do and how to do it		
27. Your choice of an ideal occupation would be one which		-10 N
1. allowed a great amount of interaction with other people		
2. would require working with a small group		
3. would allow me to work closely with one other person		
4. would allow me to work by myself		

(Table continued on next page)

Table 16 (Continued)

Occupational Endeavors Correlates and Probabilities

	Probabilities	
Item	1919 to 1950	1950 to 1961
30. In your previous jobs, which best describes your experience? 1. worked under supervision, but did not supervise others 2. worked independently, with no supervision 3. supervised one or two others 4. supervised three or more others	05 N	-20 R
31. To what degree do you feel that your most recent job makes or made use of your abilities and capacities? 1. sometimes feel inadequate for the job 2. feel stimulated and challenged by my work 3. sometimes wish the job were more difficult and challenging	05 N	
32. About how often do you get together after hours with some of the people with whom you work? 1. do not work with people or not at all 2. about once a month 3. about twice a month 4. 3 to 6 times a month 5. 7 or more times a month		-10 R -10 T
33. Do you find yourself bringing problems from home to work? 1. frequently 2. occasionally 3. seldom 4. never	-20 N -20 R -20 T	-05 V -20 N -05 T
34. How much recognition do you receive for doing a good job? 1. none at all 2. occasionally a good job is recognized, but not often 3. about as much as anyone else 4. as much as is deserved 5. sometimes more than is deserved	20 V 20 T	

(Table continued on next page)

Table 16 (Continued)

Occupational Endeavors Correlates and Probabilities

	Probabilities	
Item	1919 to 1950	1950 to 1961
36. What is your feeling about the pace of the jobs you have held? 1. I've always had time to spare 2. I've been reasonably busy, but never pushed 3. I've felt crowded and extended only occasionally 4. I've always had to push quite hard to get everything done 5. I've always been loaded with more than I could possibly do		05 N
82. What part of your present income are you able to save or invest? 1. less than 10% 2. 10 - 20% 3. 20 - 40% 4. 40 - 50% 5. more than 50%	20 V 05 R 05 T	
105. Present occupational position on the Warner Scale. 1. highest level 2. second highest level 3. third 4. fourth 5. fifth 6. sixth 7. lowest level	-01 R -05 T	10 R
107. What was your approximate income (from all sources) during 1960? 1. $0 - 6,999 2. $7,000 - 12,999 3. $13,000 - 16,999 4. $17,000 - 24,999 5. $25,000 or more	10 N 05 R 05 T	-20 T

(Table continued on next page)

Table 16 (Continued)

Occupational Endeavors Correlates and Probabilities

	Probabilities	
Item	1919 to 1950	1950 to 1961
110. According to present and past occupational positions, which way has individual moved? 1. moved up 2. stayed same 3. moved down	-10 R	10 R 20 T
111. How many occupational positions have you held for a period of 5 years or more? 1. 1 2. 2 3. 3 4. 4 5. 5 6. 6	-20 N -05 R -20 T	-20 V
115. How many hours a day do you spend working? 1. 7 or less 2. 8 3. 9 4. 10 5. 11 or more	10 V 10 T	-10 R

Table 17

Adult Home and Community Life Correlates and Probabilities

	Probabilities	
Item	1919 to 1950	1950 to 1961
39. Where have you lived most of your adult life? 1. a large city (over 500,000) 2. a city (20,000 to 500,000) 3. a town (1,000 to 20,000) 4. a village (less than 1,000) 5. a rural area	-10 N -10 R -20 T	
57. How old were you when you were (first) married? 1. less than 20 years old 2. 20 to 22 years old 3. 23 to 25 years old 4. 26 to 30 years old 5. over 31 years old or never married	-10 N	
60. At the present time do you: (Check one) 1. own my own home or apartment 2. rent a house 3. rent an apartment 4. rent a room 5. live with relatives	20 V -10 N	20 V 20 N 20 T
62. With whom have you lived for most of the last ten years? 1. with wife 2. with child or children 3. with other relatives 4. with non-relatives 5. alone		01 V 10 T
81. At the present time, the amount of life insurance you hold on your own life is: (Check one) 1. none 2. less than $5,000 3. $5,000 to $9,900 4. $10,000 to $24,000 5. $25,000 to $50,000 6. over $50,000	01 R 05 T	-20 R

(Table continued on next page)

Table 17 (Continued)

Adult Home and Community Life Correlates and Probabilities

Item	Probabilities 1919 to 1950	 1950 to 1961
112. How old was your mother when she died? 1. 49 or less 2. 50 - 69 3. 70 - 79 4. 80 or more 5. mother still living	20 V 20 T	

Table 18

Interest Correlates and Probabilities

Item	Probabilities	
	1919 to 1950	1950 to 1961
59. During your adult life, have you entertained friends 1. several times a week 2. about once a week 3. 2 or 3 times a month 4. once a month 5. a few times a year	05 N 05 R 20 T	-10 N -20 R
63. What is your attitude toward social gatherings? 1. I enjoy them thoroughly 2. I enjoy them if they are not too frequent 3. I am somewhat indifferent to them 4. I believe they are a waste of time, but I go occasionally 5. I avoid them as completely as possible		-05 V -05 T
64. Which one of the following most nearly fits your pattern of reading? 1. devote much time to reading of all kinds including that related to my work 2. devote considerable time to reading in areas directly related to my work, but little time reading other things 3. find that I have little time for reading although I read as much as I can 4. read only the newspaper and an occasional magazine 5. usually have more important things to do than read	-10 V -20 T	-20 V 05 R

(Table continued on next page)

Table 18 (Continued)

Interest Correlates and Probabilities

Item		Probabilities	
		1919 to 1950	1950 to 1961
66.	How much time, on the average, do you spend reading journals, magazines, or books relating to your work? 1. none 2. less than 1 hour a week 3. 1 to 3 hours a week 4. 4 to 7 hours a week 5. more than 7 hours a week	01 V -20 N 20 T	20 V
100.	About how many motion pictures have you attended during the past year? (Or a typical year) 1. 0 2. 1 or 2 3. 3 to 10 4. 11 to 20 5. 21 or more	05 N	20 T
101.	About how often do you spend an evening at home in leisurely reading? 1. practically never 2. occasionally 3. frequently		05 V 20 T
103.	To how many clubs or fraternal organizations do you belong? 1. none 2. one 3. two 4. three 5. four or more		10 N
106.	In how many social welfare activities are you actively engaged? 1. none 2. one 3. two 4. three or more	-20 N	01 N 10 R

Table 19

Personal Characteristic Correlates and Probabilities

Item	Probabilities 1919 to 1950	Probabilities 1950 to 1961
4. How long has it been since you have taken (or given) an intelligence test? 1. within 2 weeks 2. within 3 months 3. within 2 years 4. within 5 years 5. the time of our last testing	-05 N	01 R 05 T
5. How many items in the Alpha examination seemed familiar to you as you repeated it? 1. only 2 or 3 2. perhaps 1/10th 3. perhaps 1/4th 4. about 1/2 5. most all of them seemed familiar	05 V 20 N 01 R 01 T	05 V
67. If you were at a "classical" music concert, what would be your usual reaction to the music? (Check one) 1. think of other things most of the time, thus shutting the music out of my consciousness 2. daydream a lot, the mood of my daydream being affected by the mood of the music 3. respond emotionally to the mood of the music itself with very little or no daydreaming 4. concentrate on the technical aspects of the music, listening for particular effects between instruments, etc.	20 V 10 T	
68. Do you consider your reading speed to be: 1. below average 2. about average 3. above average	20 N	20 V -10 N

(Table continued on next page)

Table 19 (Continued)

Personal Characteristic Correlates and Probabilities

	Probabilities	
Item	1919 to 1950	1950 to 1961
71. Is your chief goal in life now the same as through most of your adult years? 1. exactly the same 2. somewhat changed 3. completely changed	20 T	-10 R
75. During the last 10 years do you consider that you have been: 1. extremely religious 2. moderately religious 3. only nominally religious 4. undecided about the place of religion 5. without religion	-10 V -20 R -05 T	-10 N
76. As you have grown older have you become: 1. more religious 2. largely unchanged in religious feeling 3. less religious		20 V 20 R 20 T
77. What has your experience with people been? 1. there is a lot of good in all people 2. there is some good in most everyone 3. people are about as good as they have to be 4. a surprising number of people are mean and dishonest 5. most people are just no good		20 V 10 R 05 T
78. How do you usually behave in a group session with your associates? 1. I feel free to express my views, and I sway the group considerably 2. I feel free to express my views but the group doesn't always share them 3. I am reluctant to express my views, but they are usually very well received 4. I am reluctant to express my views and unsure of their reception 5. I don't usually participate	-01 R -05 T	05 R 20 T

(Table continued on next page)

Table 19 (Continued)

Personal Characteristic Correlates and Probabilities

	Probabilities	
Item	1919 to 1950	1950 to 1961
79. In your relations with other people do you try to: 1. please other people at any cost 2. please other people if it doesn't go counter to my own feelings 3. act according to my own feelings without regard to others' feelings		-05 N
80. When your opinions differ from those of others, do you generally: 1. keep them to myself 2. express them to my associates 3. express them regardless of the status of the person differing with me	01 R 01 T	-01 R -20 T
83. Concerning your present and future activities, do you: 1. make rather precise and detailed plans 2. make broad and general plans, but not detailed ones 3. make few plans, let "nature take its course"		-20 V -01 N -20 T
84. Do you keep a personal budget and account of what you spend? 1. keep exact records and budget all expenses 2. keep exact records and manage the spending according to a general plan 3. do not keep exact records or budgets, but do manage expenses according to a plan 4. have tried keeping records or budgets, but have found them unnecessary 5. have never found it necessary to keep exact records or budgets	-20 V -10 T	

(Table continued on next page)

Table 19 (Continued)

Personal Characteristic Correlates and Probabilities

	Probabilities	
Item	1919 to 1950	1950 to 1961
85. How many times have you had an idea that you simply had to write down before you forgot it? 1. never 2. very few times 3. several times 4. many times	05 V 20 T	-20 V 20 N
86. How have you reacted to the advantages and opportunities that have been presented to you? 1. have taken advantage of almost every opportunity 2. have not had too many opportunities but have taken advantage of those I have had 3. have usually tried to take advantage of any opportunity 4. have taken advantage of some but not of others 5. have largely failed to take advantage of the few good opportunities I have had		10 V 20 N
88. Do you consider yourself a: (Check one) 1. nervous person 2. fairly tense person 3. fairly relaxed person, except when job tensions build up 4. fairly relaxed person 5. relaxed person		-05 V -20 N -01 T
89. How do you tend to react to an unpleasant situation? (Check one) 1. I generally try to figure out the best solution and react immediately 2. most of the time I put off a decision so I can think it over 3. often I want to sleep on it or put off a decision for quite awhile 4. I don't worry about it, things will take care of themselves		-20 V -20 T

(Table continued on next page)

Table 19 (Continued)

Personal Characteristic Correlates and Probabilities

	Probabilities	
Item	1919 to 1950	1950 to 1961
90. What period of your life do you remember as your happiest? 1. early childhood 2. school years 3. college years 4. early working years 5. middle working years 6. recent past	20 V 10 R 05 T	
91. Have you often desired something so much you would do almost anything for it? 1. never 2. once 3. twice 4. three or more times	-05 V -05 T	
93. How often do you tell jokes? 1. very frequently 2. frequently 3. occasionally 4. seldom 5. can't remember jokes	-20 V -10 N -20 R -01 T	20 N
94. How well do you do most things you have decided to do? 1. almost always succeed in the things I attempt and do them better than most people could 2. find that I do most things as well as other people do 3. usually get the things done that I attempt but seldom do them as well as I want to 4. often find I have bitten off more than I can chew and have to give up	-05 R	20 R
95. How fast do you usually work? 1. much faster than most people 2. somewhat faster than most people 3. about the same speed as most other people 4. somewhat slower than most people 5. much slower than most people	-01 R -01 T	

(Table continued on next page)

Table 19 (Continued)

Personal Characteristic Correlates and Probabilities

	Probabilities	
Item	1919 to 1950	1950 to 1961
96. How greatly disturbed are you if something is left unfinished? 1. slightly 2. moderately 3. considerably 4. highly	-10 N	01 N -20 R
98. Do you think your friends have generally considered you: 1. quite curious about the world around me 2. moderately curious 3. quite indifferent	-20 T	20 N
99. How often do you feel dissatisfied with yourself? 1. frequently 2. occasionally 3. rarely 4. hardly ever	-05 V -05 T	-05 N -20 T

These correlates are examined and summarized in the Discussion section.

Factor Analysis

Initially, 20 factors were extracted from the 90 x 90 correlation matrix representing 82 life history variables plus eight criteria. The results of this computation, which may be found in Table 20, yielded the information for Fig. 1.

As mentioned previously, both five and nine factors were rotated obliquely. The results of the multiple-judge factor naming procedure indicated a general ambiguity among the later factors in the nine factor rotation. This fact, plus the high degree of agreement among judges on the five factor rotation, prompted the decision to use the latter for the final analysis.

The number of items with loadings of .30 or greater and the number of criteria with loadings of .20 or greater on each factor are shown in Table 21. Table 22 contains the matrix of factor intercorrelations. It should be emphasized that although the rotation program was designed to permit an oblique solution, the obtained correlations between factors were extremely low. The highest correlation in the matrix is .113 between Factor I and Factor III. Thus, for all practical purposes, the factors may be considered as essentially uncorrelated or orthogonal.

Table 20

Data Concurrent with the Extraction of 20 Factors

Factor	Latent Root	% Variance Accounted for	Cumulative % Variance Accounted for
I	6.67	7.94	7.94
II	4.60	5.47	13.41
III	4.21	5.01	18.42
IV	3.22	3.83	22.25
V	3.21	3.81	26.06
VI	2.90	3.45	29.51
VII	2.85	3.39	32.90
VIII	2.67	3.17	36.07
IX	2.63	3.13	39.20
X	2.47	2.94	42.14
XI	2.20	2.62	44.76
XII	2.12	2.51	47.27
XIII	2.08	2.47	49.74
XIV	2.02	2.41	52.15
XV	1.91	2.27	54.42
XVI	1.83	2.17	56.59
XVII	1.83	2.17	58.77
XVIII	1.66	1.97	60.74
XIX	1.62	1.92	62.66
XX	1.57	1.87	64.53

Table 21

Number of Variables Loading on Given Factors

Factor	Items Loading .30 or Greater	Criteria Loading .20 or Greater
I	17	2
II	13	4
III	15	1
IV	15	1
V	11	3

Table 22

Matrix of Factor Intercorrelations

	II	III	IV	V
I	.088	.113	-.086	-.063
II		.087	-.056	-.069
III			-.051	.037
IV				.067

Factor I. Socio-economic Success was the name given to the first and largest factor, accounting for 7 percent of the total variance. The items constituting this factor and their loadings are shown in Table 23. The response pattern can be summarized as follows:

1. Rated high occupationally.
2. Hold a large amount of life insurance.
3. Receive a large income.
4. Moved up occupationally.
5. Live in a large city.
6. Supervise people.
7. Prefer to have many projects "on the fire" simultaneously.
8. Save a large part of present income.
9. Prefer to work with others, rather than alone.
10. Work faster than most.
11. Goals have been fulfilled or surpassed.
12. Dislike direct supervision.
13. Married early.
14. College contributed to life's goals.

The most outstanding characteristic of this response pattern is the high level of occupational and financial success. Another characteristic might be termed an "executive attitude." This is exemplified through a desire for minimal external control present in a supervisory position, a high drive level relating to work, and an acceptance of responsibility.

Table 23

Items Composing Factor I

Item #	Item	Loading
75	What is your present occupation? 1. highest level on Warner's scale 2. 3. 4. 5. 6. 7. lowest level on Warner's scale	-.77
55	At the present time, the amount of life insurance you hold on your own life is: 1. none 2. less than $5,000 3. $5,000 to 9,900 4. $10,000 to 24,000 5. $25,000 to 50,000 6. over $50,000	.75
77	What was your approximate income for 1960? 1. $0 - 6,999 2. $7,000 - 12,999 3. $13,000 - 16,999 4. $17,000 - 24,999 5. $25,000 or more	.74
79	According to present and past occupational positions, which way has individual moved? 1. moved up 2. stayed same 3. moved down	-.67
29	Where have you lived most of your adult life? 1. a large city (over 500,000) 2. a city (20,000 to 500,000) 3. a town (1,000 to 20,000) 4. a village (less than 1,000) 5. a rural area	-.63

(Table continued on next page)

Table 23 (Continued)

Items Composing Factor I

Item #	Item	Loading
21	In your previous jobs, which best describes your experience? 1. worked under supervision, but did not supervise others 2. worked independently, with no supervision 3. supervised one or two others 4. supervised three or more others	.57
18	Generally, in your work, would you prefer: 1. to work at one thing at a time 2. to work at two or three things at a time 3. to have many things "on the fire" simultaneously	.51
56	What part of your present income are you able to save or invest? 1. less than 10% 2. 10 - 20% 3. 20 - 40% 4. 40 - 50% 5. more than 50%	.41
20	Your choice of an ideal occupation would be one which 1. allowed a great amount of interaction with other people 2. would require working with a small group 3. would allow me to work closely with one other person 4. would allow me to work by myself	-.39
67	How fast do you usually work? 1. much faster than most people 2. somewhat faster than most people 3. about the same speed as most other people 4. somewhat slower than most people 5. much slower than most people	-.39

(Table continued on next page)

Table 23 (Continued)

Items Composing Factor I

Item #	Item	Loading
16	Relative to the goals you had when you left college, your life's work: 1. has surpassed those goals 2. has fulfilled those goals 3. has not been as good work as I had hoped for 4. has been unrelated to my goals but satisfactory 5. has been unrelated to my goals and unsatisfactory	-.37
19	If you could work on what you would consider an ideal job, you would: 1. work entirely autonomously 2. work under only suggested priorities 3. expect to be told what to do, but not how to do it 4. expect to be told what to do and receive suggestions as to how to do it 5. expect to be told what to do and how to do it	-.35
39	How old were you when you were first married? 1. less than 20 years old 2. 20 to 22 years old 3. 23 to 25 years old 4. 26 to 30 years old 5. over 31 years old or never married	-.35
31	To what extent did your college education contribute to your life goals? 1. it helped me markedly 2. I believe it helped me somewhat 3. I doubt that I would have done substantially different if I had never attended college	-.34
25	How much recognition do you receive for doing a good job? 1. none at all 2. occasionally a good job is recognized, but not often 3. about as much as anyone else 4. as much as is deserved 5. sometimes more than is deserved	.32

(Table continued on next page)

Tabie 23 (Continued)

Items Composing Factor I

Item #	Item	Loading
68	How greatly disturbed are you if something is left unfinished? 1. slightly 2. moderately 3. considerably 4. highly	.31
35	How much independence do you feel your parents allowed you while in high school? 1. very little 2. about as much as the rest of my friends 3. quite lenient, a good deal 4. as much as I wanted	.31

Factor II. The second factor has been named Sensitive Intelligence and accounted for 5.2 percent of the total variance. Table 24 shows the items loading on this factor. Sensitive Intelligence can be described as follows:

1. Upset by some tragedy in youth.
2. A number of Alpha items seemed familiar from past administrations.
3. Frequently write down ideas.
4. Tell jokes frequently.
5. Devote much time to reading.
6. Sometimes become tense and nervous.
7. Keep some records and budget expenses.
8. Are moderately religious.
9. Occasionally bring problems from home to work.
10. Have long job tenure.
11. Sometimes feel dissatisfied with themselves.

In general, this hypothetical individual has some characteristics commonly associated with a high level of intelligence. These include an interest in reading and verbal expression and a good memory. In addition to this intellectual syndrome, the factor contains a pattern of emotionally toned items describing an individual who is tense, somewhat compulsive and perseverative, has experienced some tragedy in his youth, and feels some self-dissatisfaction. Although these characteristics do not warrant the title of neurotic or maladjusted, they do suggest a pattern of emotionality or sensitivity.

Table 24

Items Composing Factor II

Item #	Item	Loading
6	As a youth, were you ever so upset by some tragedy that you brooded for some time over the meaning of life? 1. yes 2. I've been upset, but seldom brooded over it 3. no	-.51
4	How many items in the Alpha examination seemed familiar to you as you repeated it? 1. only 2 or 3 2. perhaps 1/10th 3. perhaps 1/4th 4. about 1/2 5. most all of them seemed familiar	.48
59	How many times have you had an idea that you simply had to write down before you forgot it? 1. never 2. very few times 3. several times 4. many times	.42
65	How often do you tell jokes? 1. very frequently 2. frequently 3. occasionally 4. seldom 5. can't remember jokes	-.42
44	Which one of the following most nearly fits your pattern of reading? 1. devote much time to reading of all kinds including that related to work 2. devote considerable time to reading in areas directly related to my work, but little time for reading other things 3. find that I have little time for reading although I read as much as I can 4. read only the newspaper and an occasional magazine 5. usually have more important things to do than read	-.41

(Table continued on next page)

Table 24 (Continued)

Items Composing Factor II

Item #	Item	Loading
61	Do you consider yourself a: 1. nervous person 2. fairly tense person 3. fairly relaxed person, except when job tensions build up 4. fairly relaxed person 5. relaxed person	-.40
58	Do you keep a personal budget and account of what you spend? 1. keep exact records and budget all expenses 2. keep exact records and manage the spending according to a general plan 3. do not keep exact records or budgets, but do manage expenses according to a plan 4. have tried keeping records or budgets, but have found them unnecessary 5. have never found it necessary to keep exact records or budgets	-.39
49	During the last 10 years do you consider that you have been? 1. extremely religious 2. moderately religious 3. only nominally religious 4. undecided about the place of religion 5. without religion	-.37
24	Do you find yourself bringing problems from home to work? 1. frequently 2. occasionally 3. seldom 4. never	-.35

(Table continued on next page)

Table 24 (Continued)

Items Composing Factor II

Item #	Item	Loading
17	Your average length of service in all your previous full-time jobs was: 1. no previous jobs of less than one year 2. one to two years 3. three to four years 4. five to six years 5. seven to eight years 6. nine to ten years 7. more than ten years	-.33
70	How often do you feel dissatisfied with yourself? 1. frequently 2. occasionally 3. rarely 4. hardly ever	-.33
63	What period of your life do you remember as your happiest? 1. early childhood 2. school years 3. college years 4. early working years 5. middle working years 6. recent past	.31
12	Has your health kept you out of activities or out of the company of people you think you would have enjoyed? 1. often 2. sometimes 3. rarely 4. never	-.30

Factor III. This factor has been entitled Physical Vigor and accounted for 5.1 percent of the total variance. The items composing this factor and their loadings are shown in Table 25. Factor III is summarized as follows:

1. Characterize their physical vigor as above average.
2. Work is not tiring. (This is supported by two items with factor loadings in the high .40's.)
3. Have taken advantage of their opportunities.
4. Rarely feel dissatisfied with themselves.
5. Concentrate on the technical aspects of the music at a concert.
6. Feel adequate for their jobs.
7. Health has rarely, if ever, kept them out of activities.
8. Consider themselves more successful than average in things attempted.
9. Feel they worked up to potential in college.
10. Rarely had an idea they had to write down before forgetting it.
11. Formed occupational goals early in life.
12. Do not receive adequate recognition for a good job.
13. Earned most of their college expenses.

This hypothetical individual is physically vigorous and seems to possess a great deal of self-confidence. He appears outwardly self-satisfied and considers himself above average on a number of favorable traits. His responses indicate an aggressive, determined approach toward life.

Table 25

Items Composing Factor III

Item #	Item	Loading
11	Over the last 10 years, how would you characterize your physical vigor? 1. exceptional 2. good 3. average 4. poor 5. very poor	-.70
26	Through your adult life, how tiring has your work been? 1. very tiring--exhausting 2. moderately tiring 3. I only occasionally felt tired 4. I never thought about being tired	.49
9	Does a typical day at work tire you out? 1. much more than the average person my age 2. somewhat more than the average person my age 3. somewhat less than the average person my age 4. much less than the average person my age	.47
60	How have you reacted to the advantages and opportunities that have been presented to you? 1. have taken advantage of almost every opportunity 2. have not had too many opportunities but have taken advantage of those I have had 3. have usually tried to take advantage of any opportunity 4. have taken advantage of some but not of others 5. have largely failed to take advantage of the few good opportunities I have had	-.46

(Table continued on next page)

Table 25 (Continued)

Items Composing Factor III

Item #	Item	Loading
42	With whom have you lived for most of the last ten years? 1. with wife 2. with child or children 3. with other relatives 4. with non-relatives 5. alone	.44
70	How often do you feel dissatisfied with yourself? 1. frequently 2. occasionally 3. rarely 4. hardly ever	.43
46	If you were at a "classical" music concert, what would be your usual reaction to the music? 1. think of other things most of the time, thus shutting the music out of my consciousness 2. daydream a lot, the mood of my daydream being affected by the mood of the music 3. respond emotionally to the mood of the music itself with very little or no daydreaming 4. concentrate on the technical aspects of the music, listening for particular effects between instruments, etc.	.43
22	To what degree do you feel that your most recent job makes or made use of your abilities and capacities? 1. sometimes feel inadequate for the job 2. feel stimulated and challenged by my work 3. sometimes wish the job were more difficult and challenging	.40
12	Has your health kept you out of activities or out of the company of people you think you would have enjoyed? 1. often 2. sometimes 3. rarely 4. never	.38

(Table continued on next page)

Table 25 (Continued)

Items Composing Factor III

Item #	Item	Loading
66	How well do you do most things you have decided to do? 1. almost always succeed in the things I attempt and do them better than most people could 2. find that I do most things as well as other people do 3. usually get the things done that I attempt but seldom do them as well as I want to 4. often find I have bitten off more than I can chew and have to give up	-.37
34	How much better could you have done in college, scholastically, than you actually did? 1. quite a bit better--I didn't apply myself 2. a little better--I was not too serious 3. not much better--I did about as well as my abilities permitted	.37
59	How many times have you had an idea that you simply had to write down before you forgot it? 1. never 2. very few times 3. several times 4. many times	-.37
15	By the time you finished high school, how did you feel toward your life's occupation? 1. knew what I wanted in the way of a job and have not changed my mind 2. thought I knew what I wanted but have since changed my mind 3. had some idea of what I wanted to enter 4. had little or no idea of what I wanted to enter because I was interested in many things 5. had little or no idea what I wanted to enter because few things interested me	-.35

(Table continued on next page)

Table 25 (Continued)

Items Composing Factor III

Item #	Item	Loading
25	How much recognition do you receive for doing a good job? 1. none at all 2. occasionally a good job is recognized, but not often 3. about as much as anyone else 4. as much as is deserved 5. sometimes more than is deserved	-.33
33	What proportion of your college expenses did you earn personally? 1. less than 1/10th 2. 1/10th to 1/4th 3. 1/4th to 1/2 4. 1/2 to 3/4ths 5. nearly all	.31

Factor IV. Introversion was the title given to the fourth factor, accounting for 4.2 percent of the total variance. The composition of Factor IV is shown in Table 26. The following response pattern defines Factor IV:

1. Do not particularly enjoy social gatherings.
2. Do not get together socially with business associates.
3. Feel people are not all good.
4. Lived in a town or city, rather than a rural area prior to college.
5. Consider themselves fairly tense or nervous.
6. Mother died at an old age or is still living.
7. Prefer to work on one thing at a time.
8. Have experienced major surgery more times than the average subject.
9. Health has sometimes inhibited social activities.
10. Are considerably disturbed if something is left unfinished.
11. Have turned down social engagements because they were tired.
12. Activities have been suspended because of accident more often than average subject.
13. Are reluctant to express their views in a group situation.

This synthetic individual exhibits a pattern of withdrawal from social activities, has a negative opinion of people, considers himself tense or nervous, and is, to some extent,

Table 26

Items Composing Factor IV

Item #	Item	Loading
43	What is your attitude toward social gatherings? 1. I enjoy them thoroughly 2. I enjoy them if they are not too frequent 3. I am somewhat indifferent to them 4. I believe they are a waste of time, but I go occasionally 5. I avoid them as completely as possible	.50
23	About how often do you get together after hours with some of the people with whom you work? 1. not at all or do not work with people 2. about once a month 3. about twice a month 4. 3 to 6 times a month 5. 7 or more times a month	-.47
51	What has your experience with people been? 1. there is a lot of good in all people 2. there is some good in most everyone 3. people are about as good as they have to be 4. a surprising number of people are mean and dishonest 5. most people are just no good	.45
28	Prior to going to college, you lived most of your life in: 1. a large city (over 500,000) 2. a city (20,000 to 500,000) 3. a town (1,000 to 20,000) 4. a village (less than 1,000) 5. a rural area	-.43

(Table continued on next page)

Table 26 (Continued)

Items Composing Factor IV

Item #	Item	Loading
61	Do you consider yourself a: 1. nervous person 2. fairly tense person 3. fairly relaxed person, except when job tensions build up 4. fairly relaxed person 5. relaxed person	-.43
81	How old was your mother when she died? 1. 49 or less 2. 50 - 69 3. 70 - 79 4. 80 or more 5. still living	.42
18	Generally in your work, would you prefer: 1. to work at one thing at a time 2. to work on two or three things at a time 3. to have many things "on the fire" simultaneously	-.41
5	How many times have you experienced major surgery? 1. 0 2. 1 3. 2 4. 3 5. 4 or more	.38
12	Has your health kept you out of activities or out of the company of people you think you would have enjoyed? 1. often 2. sometimes 3. rarely 4. never	-.38
68	How greatly disturbed are you if something is left unfinished? 1. slightly 2. moderately 3. considerably 4. highly	.34

(Table continued on next page)

Table 26 (Continued)

Items Composing Factor IV

Item #	Item	Loading
13	When you have a cold, do you usually: 1. see a physician 2. stay home in bed 3. take home remedies 4. stay on the job, but take it easy 5. ignore it	.33
8	During the last full calendar year, how often have you had to turn down, or break, a social engagement because you were tired? 1. never 2. rarely 3. occasionally 4. frequently	.32
78	For how many days during the last full calendar year, have your normal activities been suspended because of an accident? 1. 0 days 2. 1 day 3. 2 days 4. 3 or more	.32
52	How do you usually behave in a group session with your associates? 1. I feel free to express my views, and I sway the group considerably 2. I feel free to express my views but the group doesn't always share them 3. I am reluctant to express my views, but they are usually very well received 4. I am reluctant to express my views and unsure of their reception 5. I don't usually participate	.31
50	As you have grown older have you become: 1. more religious 2. largely unchanged in religious feeling 3. less religious	.30

compulsive. A history of accidents and poor health serves to keep him out of social activities. The fact that his mother died at an advanced age or is still living suggests the possibility of domination or attachment. In general, the emergent pattern is one which has traditionally been regarded as introversion.

Factor V. The fifth and final factor was called Egocentric Independence and accounted for 4.0 percent of the total variance. The items constituting this factor and their loadings are shown in Table 27. The response pattern can be summarized as follows:

1. Consider their own feelings before those of others.
2. Not engaged in social welfare activities.
3. Prefer to work alone.
4. Are less religious than the average subject.
5. Frequently spend an evening at home in leisurely reading.
6. Consider their reading speed to be average or above.
7. Seldom make plans regarding the future.
8. Require eight or more hours of sleep.
9. Do not feel their fathers were completely successful.
10. Life's work has fulfilled or surpassed goals.
11. Have never found it necessary to keep exact financial records or budgets.

This syndrome seems to describe an individual who is highly self-reliant, almost to the point of being selfish.

Table 27

Items Composing Factor V

Item #	Item	Loading
53	In your relations with other people do you try to: 1. please other people at any cost 2. please other people if it doesn't go counter to my own feelings 3. act according to my own feelings without regard to others' feelings	.54
76	In how many social welfare activities are you actively engaged? 1. none 2. one 3. two 4. three or more	-.46
20	Your choice of an ideal occupation would be one which 1. allowed a great deal of interaction with other people 2. would require working with a small group 3. would allow me to work closely with one other person 4. would allow me to work by myself	.44
49	During the last 10 years do you consider that you have been: 1. extremely religious 2. moderately religious 3. only nominally religious 4. undecided about the place of religion 5. without religion	.42
72	About how often do you spend an evening at home in leisurely reading? 1. practically never 2. occasionally 3. frequently	.41
47	Do you consider your reading speed to be: 1. below average 2. about average 3. above average	.41

(Table continued on next page)

Table 27 (Continued)

Items Composing Factor V

Item #	Item	Loading
57	Concerning your present and future activities, do you: 1. make rather precise and detailed plans 2. make broad and general plans, but not detailed ones 3. make few plans, let "nature take its course"	.38
7	On the average, how much sleep do you require to feel good? 1. less than 5 hours 2. 5 to 6½ hours 3. 6½ to 7 hours 4. 7 to 8 hours 5. more than 8 hours	.34
37	Using your own interpretation of what success means, do you feel your father was successful? 1. yes 2. partially, or I am not sure 3. no	.33
16	Relative to the goals you had when you left college, your life work: 1. has surpassed those goals 2. has fulfilled those goals 3. has not been as good work as I had hoped for 4. has been unrelated to my goals but satisfactory 5. has been unrelated to my goals and unsatisfactory	-.33
58	Do you keep a personal budget and account of what you spend? 1. keep exact records and budget all expenses 2. keep exact records and manage the spending according to a general plan 3. do not keep exact records or budgets, but do manage expenses according to a plan 4. have tried keeping records or budgets, but have found them unnecessary 5. have never found it necessary to keep exact records or budgets	.31

He considers himself first, does not bother with social welfare activities, prefers to work alone, and does not depend upon religion for a philosophy of life. Some tolerance for ambiguity is implied by an absence of planning for the future and of keeping records or budgets. The overall pattern suggests an individual whose interests lie in scientific areas rather than in the humanities, who is independent, and who perceives himself favorably.

Criterion Relationships to Factors

As previously noted, all eight criteria were included in the factor analysis and the rotation. This permits of a statement regarding the relationships of the criteria to the factors based on the appropriate factor loadings. This section will concern itself with an objective exposition of these relationships, mentioning only those which are supported by factor loadings of .20 or greater. A more thorough analysis and integration will be undertaken in the Discussion section.

Fig. 6 through 12 on the following pages illustrate the criterion profiles on the five factors. The criteria appear in various combinations to permit meaningful comparisons.

Total score 1950-1919. Fig. 6 shows T 1950-1919 to load high positive on two factors. A loading of .23 on Factor I, Socio-economic Success, and a loading of .69 on Factor II, Sensitive Intelligence, indicates that the

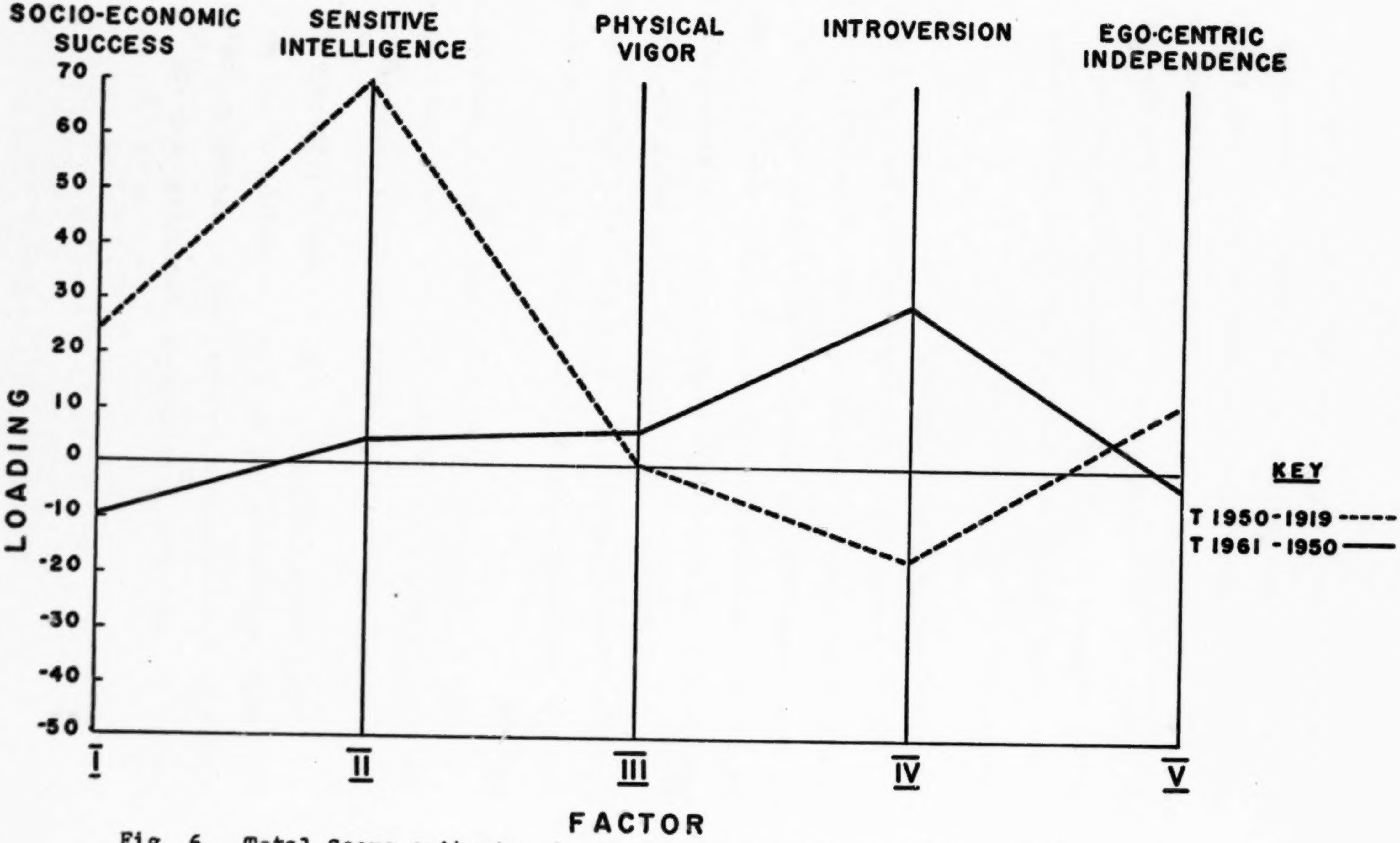

Fig. 6. Total Score criterion for both time periods profiled on factors.

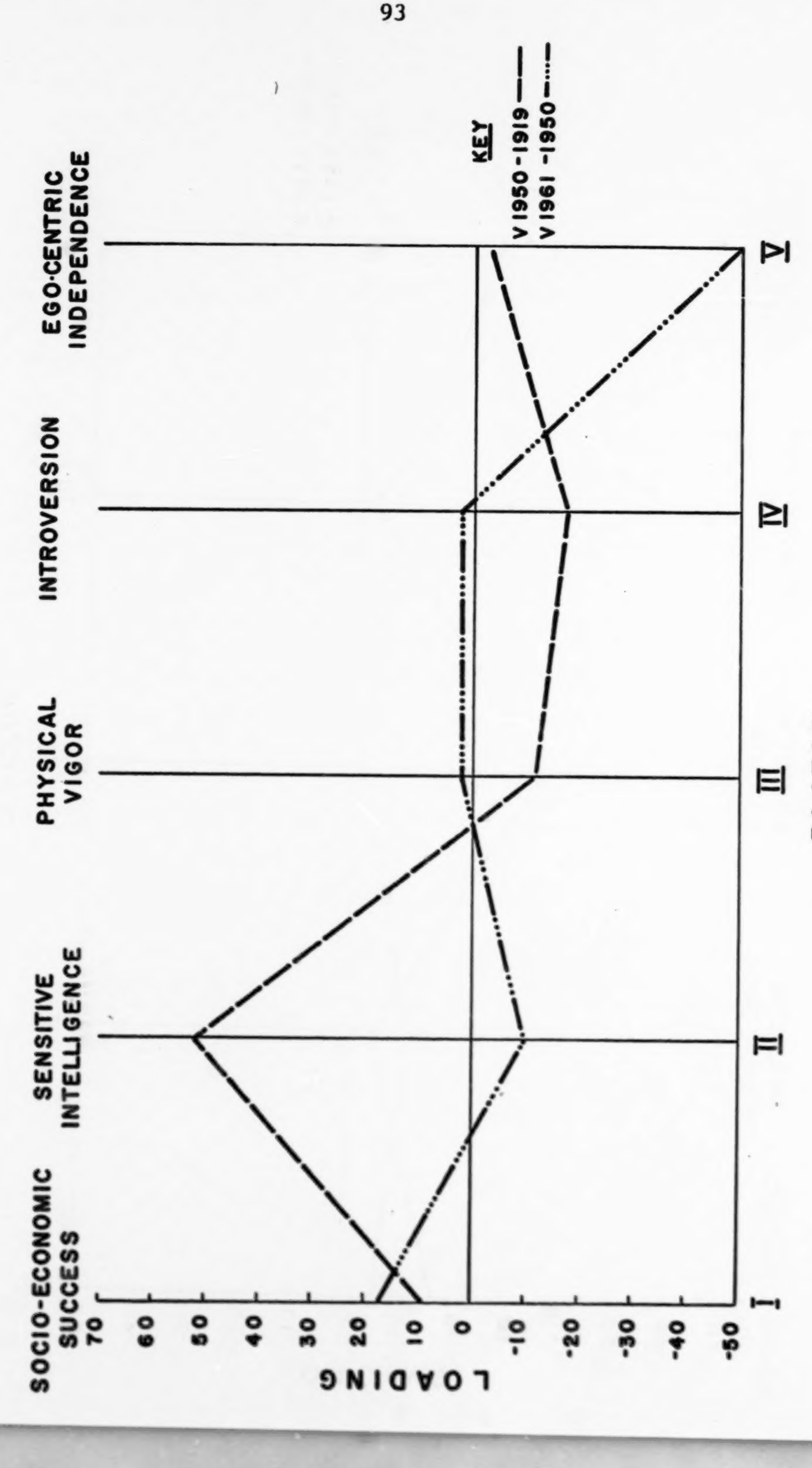

Fig. 7. Verbal Component criterion for both time periods profiled on factors.

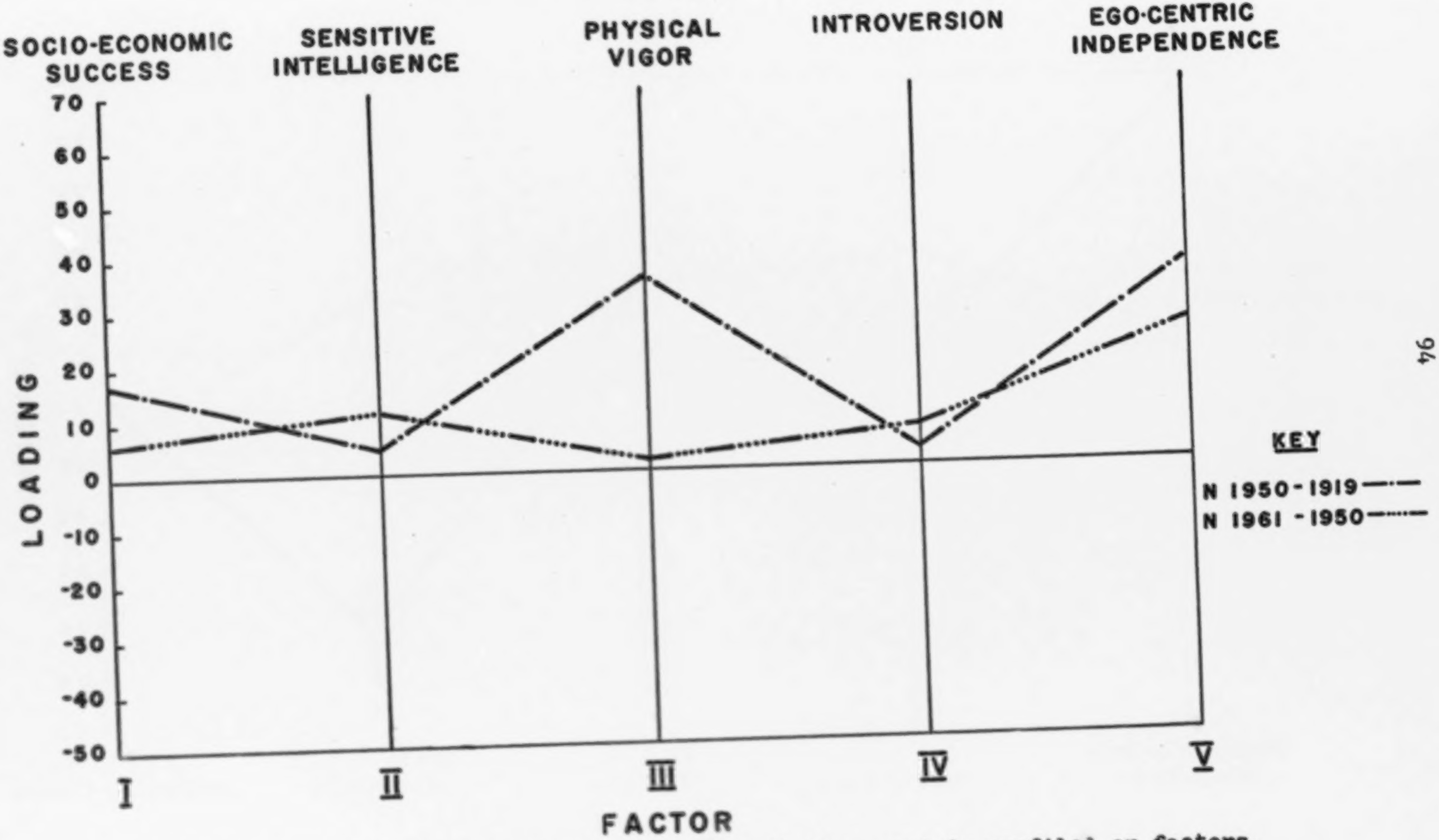

Fig. 8. Numerical Component criterion for both time periods profiled on factors.

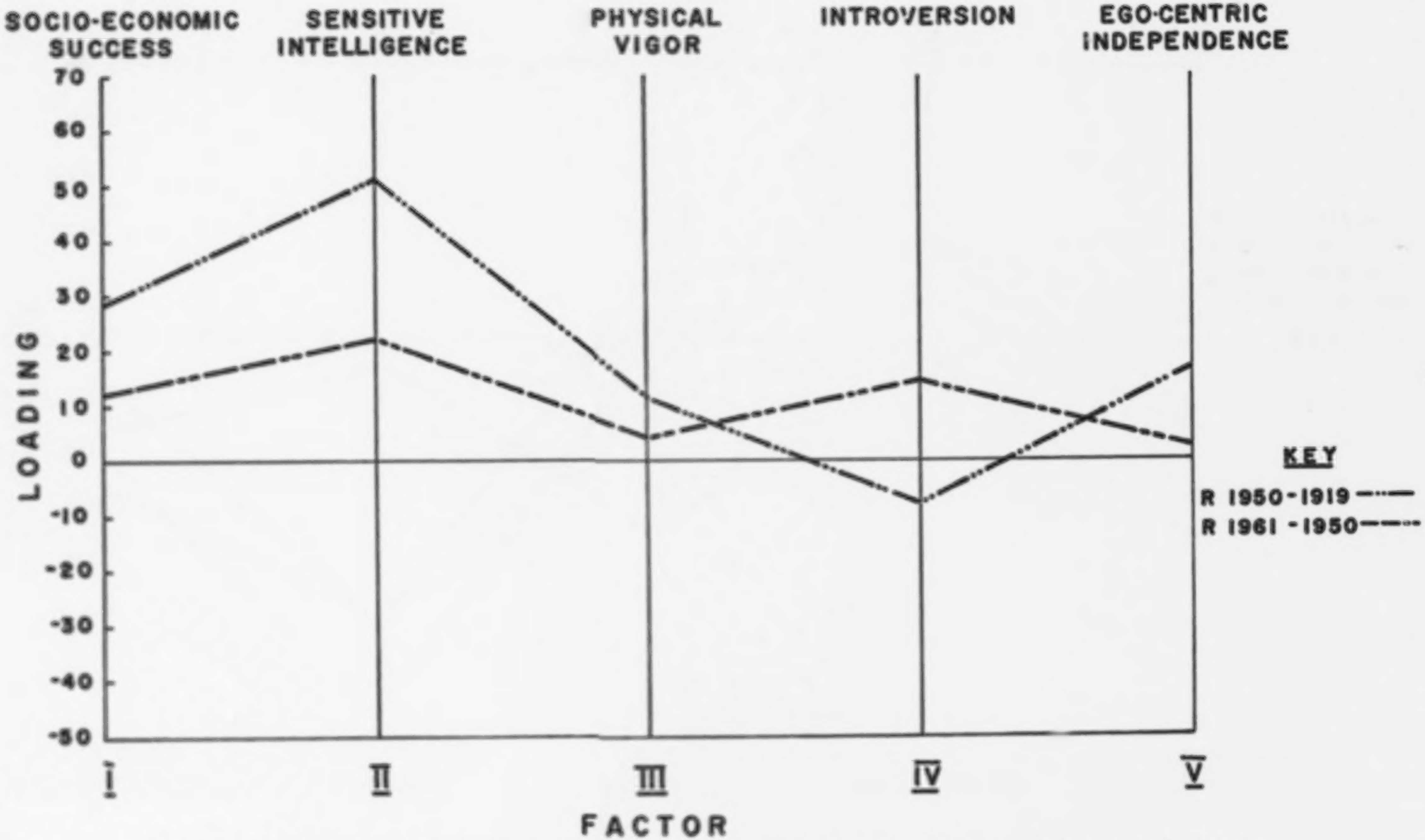

Fig. 9. Reasoning Component criterion for both time periods profiled on factors.

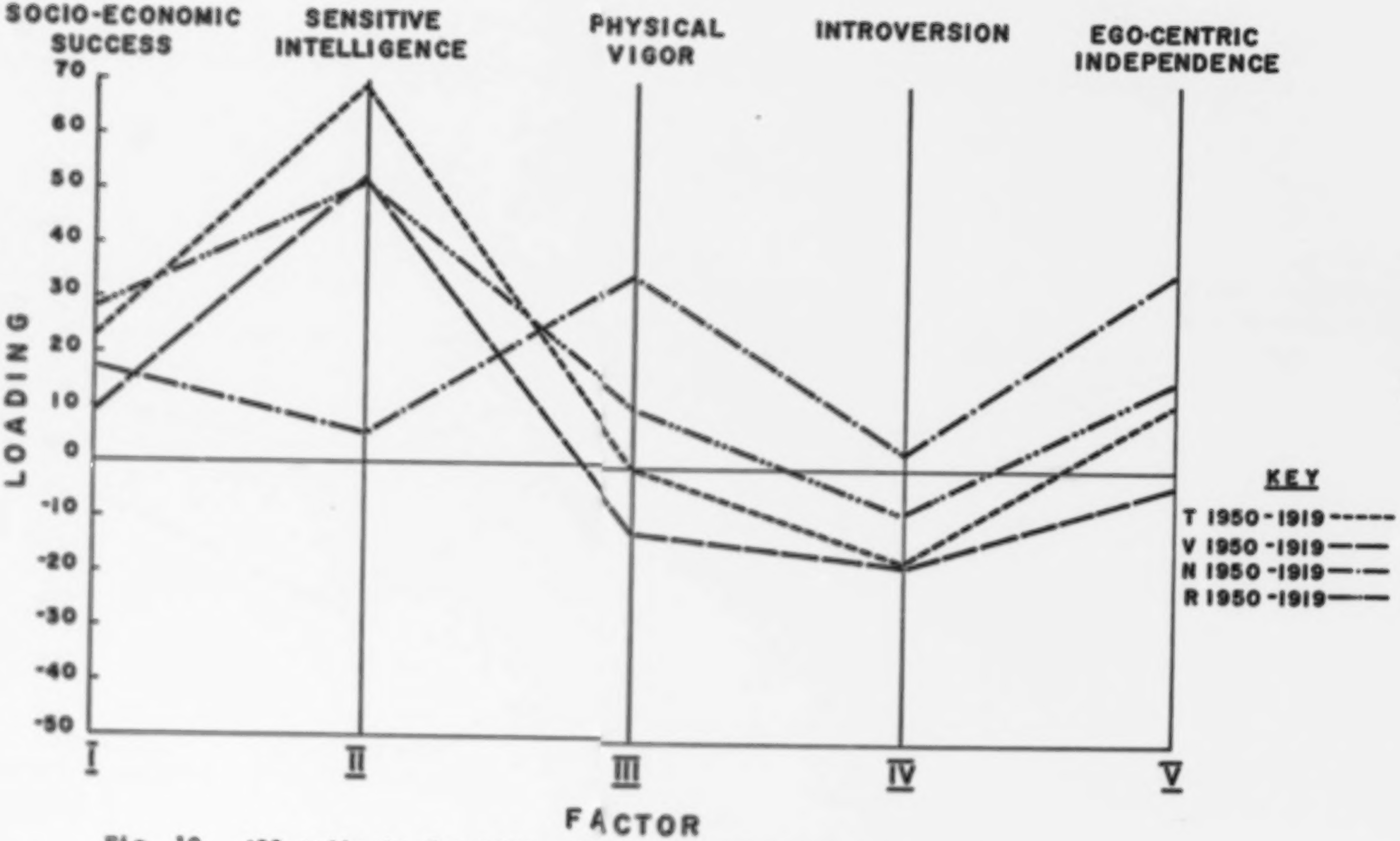

Fig. 10. All criteria for 1950 - 1919 time period profiled on factors.

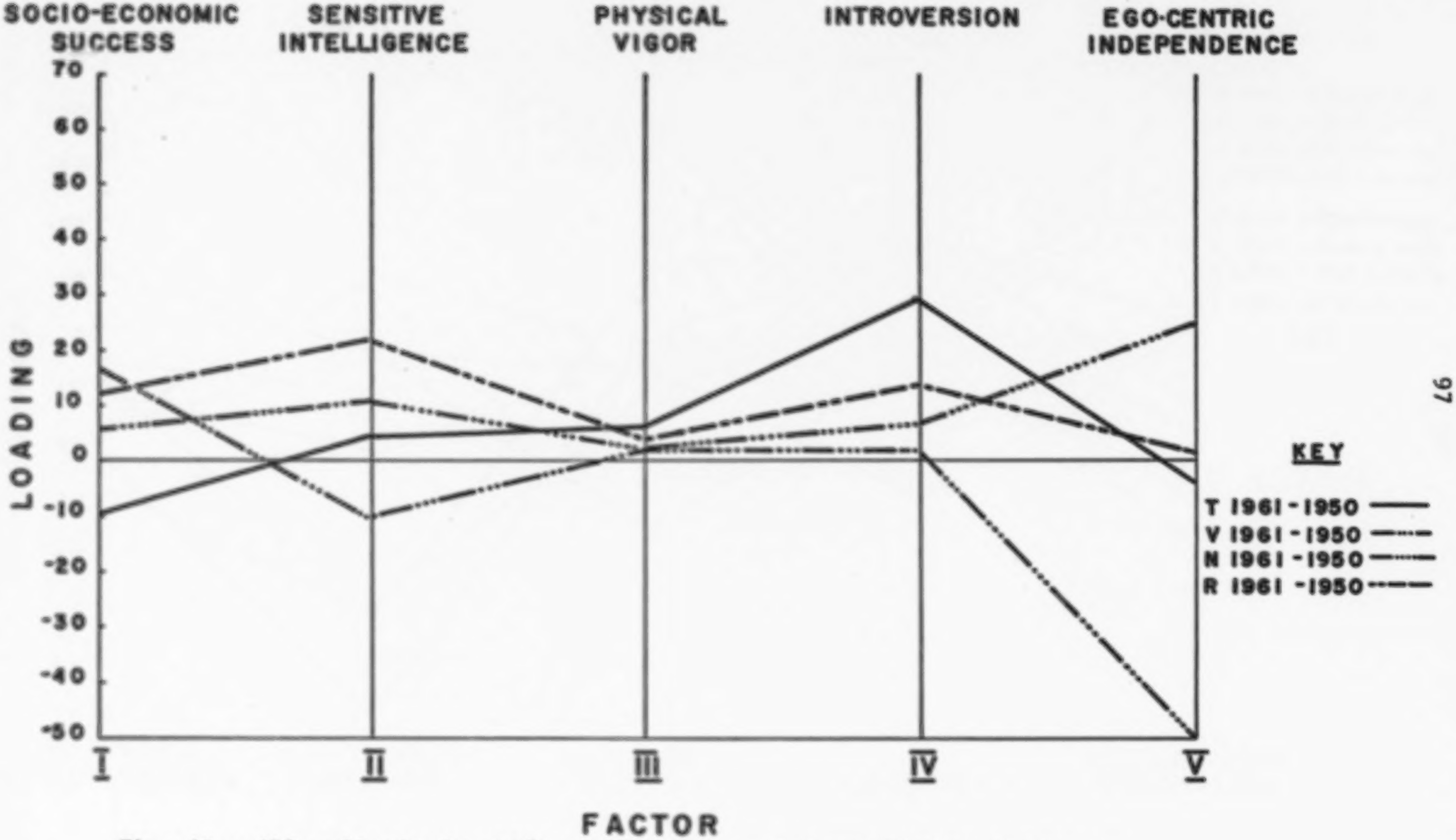

Fig. 11. All criteria for 1961 - 1950 time period profiled on factors.

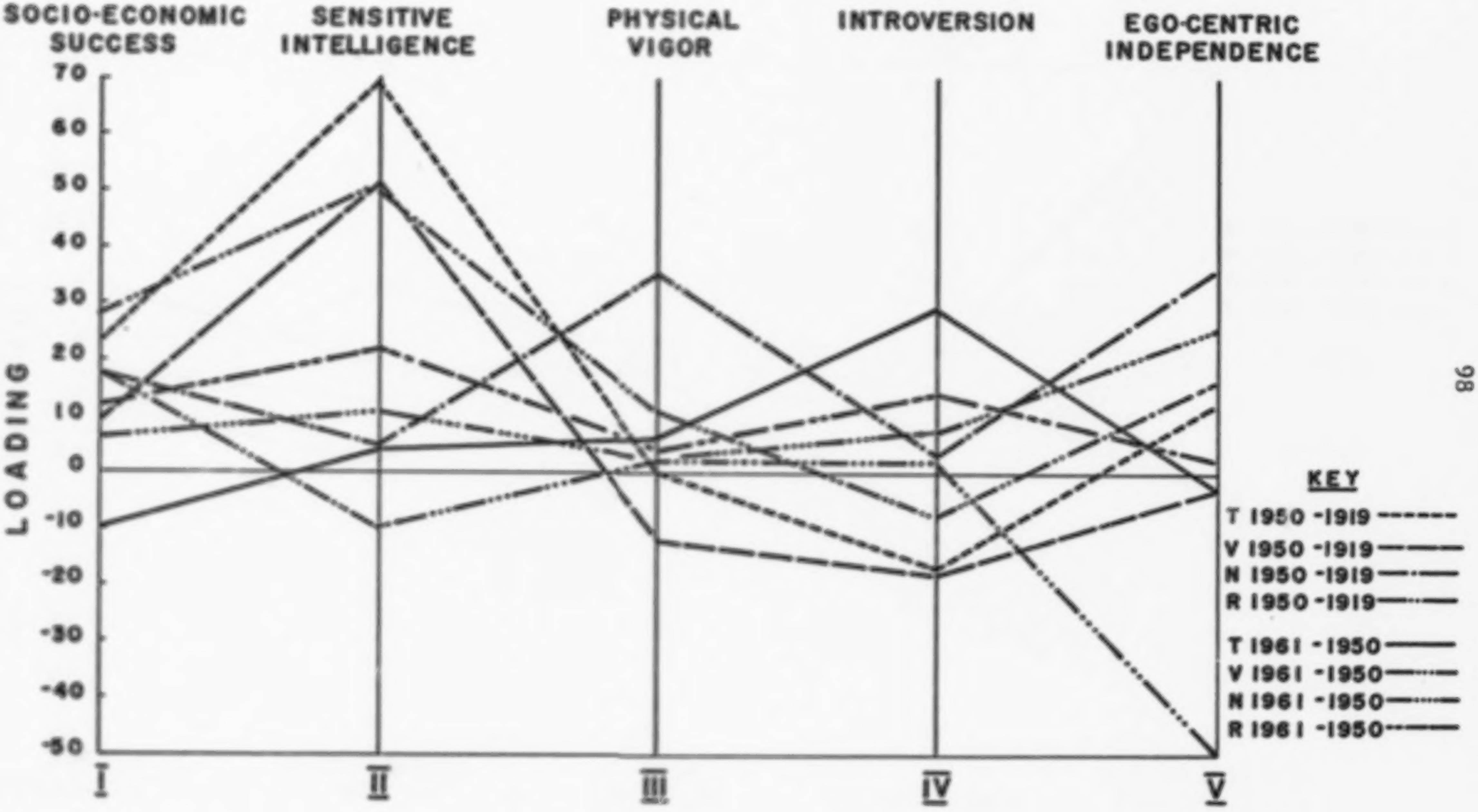

Fig. 12. All criteria for both time periods profiled on factors.

individual who scored highly on these two factors, particularly the latter, tended to show a substantial increase in Total score from 1919 to 1950.

Verbal component 1950-1919. As illustrated by Fig. 7, V 1950-1919 loaded .52 on Factor II, Sensitive Intelligence. Thus, individuals characterized by a high score on Sensitive Intelligence tended to show a substantial increase in Verbal score from 1919 to 1950.

Numerical component 1950-1919. Fig. 8 shows N 1950-1919 to load .35 on Factor III, Physical Vigor, and .36 on Factor V, Egocentric Independence. Therefore, the individuals who scored highly on Physical Vigor and/or Egocentric Independence were likely to experience a large increase in Numerical score from 1919 to 1950.

Reasoning component 1950-1919. As shown in Fig. 9, this criterion loaded .28 on Factor I, Socio-economic Success, and .51 on Factor II, Sensitive Intelligence. It follows, therefore, that we would expect the subjects who scored highly on Socio-economic Success and/or Sensitive Intelligence to exhibit a better than average increase in Reasoning score from 1919 to 1950.

Total score 1961-1950. Fig. 6 shows that Total score for the second time period loaded .29 on Factor IV, Introversion. This indicates that the individuals who scored highly on Introversion tended to show an increase in Total score from 1950 to 1961.

Verbal component 1961-1950. As indicated in Fig. 7, V 1961-1950 loaded -.50 on Factor V, Egocentric Independence. Thus, individuals characterized by a high score on Egocentric Independence characteristically displayed a decrease in Verbal score from 1950 to 1961.

Numerical component 1961-1950. Fig. 8 shows N 1961-1950 to load .25 on Factor V, Egocentric Independence. Since the group, as a whole, declined significantly on this criterion from 1950 to 1961, the individuals who scored highly on Egocentric Independence tended to decline less, or to better maintain their Numerical scores, from 1950 to 1961.

Reasoning component 1961-1950. This criterion, as illustrated in Fig. 9, loaded .22 on Factor II, Sensitive Intelligence. Individuals scoring highly on Sensitive Intelligence, therefore, tended to show an increase in Reasoning score from 1950 to 1961.

Factor Relationships to Criteria

In the previous section, the criteria were used as the keys to the analysis. In this section the procedure will be reversed and the factors will be considered, each in turn, with a brief summary of the criterion loadings.

Fig. 12 illustrates the magnitude of criterion loadings on the five factors.

Factor I. The subjects who can be characterized by Factor I, Socio-economic Success, tended to show better than average increases in Total score and Reasoning score from 1919 to 1950.

Factor II. The second factor, Sensitive Intelligence, is the most important factor in the sense that it contains four criterion loadings greater than .20. Individuals scoring highly on Sensitive Intelligence tended to show substantial increases in Total score, Verbal score, and Reasoning score from 1919 to 1950, and Reasoning score from 1950 to 1961.

Factor III. People described by Factor III, Physical Vigor, showed a substantial shift on only one criterion--an increase in Numerical score from 1919 to 1950.

Factor IV. People characterized by Factor IV, Introversion, also showed a substantial shift on only one criterion--an increase in Total score from 1950 to 1961.

Factor V. Individuals described by the last factor, Egocentric Independence, tended to show a better than average increase in Numerical score for both time periods, and also a substantial decrease in Verbal score from 1950 to 1961.

DISCUSSION

Limitations of the Study

Before proceeding to a more thorough analysis of the results, the writer feels the necessity of discussing certain constraints which, due to the methodology employed, must be applied to the findings.

First, the subjects of the study do not represent a random sample from the general population. They are clearly above average intellectually, economically, and probably in other regards. On the positive side, greater heterogeneity would tend to magnify all of the obtained relationships. On the negative side, inferences to hypothetical populations other than one composed of freshman entering midwest A & M colleges just after W.W.I. should be made with due caution.

Second, the relatively small N involved did not lend itself to cross-validation of items. What is known is that the number of discriminating items is larger than could reasonably be attributed to chance. What is not known is which items are the chance discriminators and which the true. If it were possible to utilize a new sample, one might expect that item intercorrelations and validities would shift somewhat. Factors, representing the essence of many items, should be more stable and are thus subject to less qualified interpretation.

Interpretation of Army Alpha Results

As mentioned earlier, the longitudinal approach is generally considered the most appropriate procedure to use in determining the effect of age upon mental abilities (see also Bayley, 1956). There has been a dearth, however, of longitudinal studies of this type with subjects over 50 years of age. This is probably explained by the fact that appropriate measuring instruments have been available only since W.W.I. Owens' subjects (1953) at the age of 50 scored significantly higher on most Alpha subtests and on the Total than they had as college freshmen. However, the lack of further longitudinal evidence has, thus far, left undetermined the matter of whether his subjects at age 50 were declining in test performance, were at their peak, or were still improving.

The results of the present study, the second follow-up on these subjects, indicate that with the exception of the Numerical component, their test performances did not change significantly between the ages of 50 and 61. It thus seems logical to assume that they were at or near a peak performance at age 50. Taking a still longer look backward, it now becomes apparent that these subjects performed at least one sampling of intellectual tasks considerably better at age 60 than they had at age 19. That artifacts of measurement did not unduly influence this result will become apparent in a later discussion of the matter.

Just as important as the affect of age on overall level of mental abilities is its differential affect upon various functions. Fig. 13 illustrates the fact that this differential affect of age upon subtest performance was substantial. In Fig. 13 the performance trends on all subtests and the total, and for the entire period of the longitudinal study, are plotted. In order to better portray relative change in performance over time, the 1919 standard score means of the 96 subjects were adjusted so that all eight subtests had a mean of five as of 1919. Corresponding adjustments were made to the means of the 1950 and 1961 administrations by adding appropriate constants. It is interesting to note that the reality of the Verbal, Numerical, and Reasoning components is affirmed by the internally uniform and externally differential effects of age upon them. Thus, scores on all four verbal subtests increased, those on the two reasoning subtests remained relatively constant, and the two numerical subtest scores declined with age.

It appears that whereas these 60-year-olds performed well on the total examination, they were best able to handle the verbal content and were somewhat less able to handle numerical tasks, relative to their performance at a younger

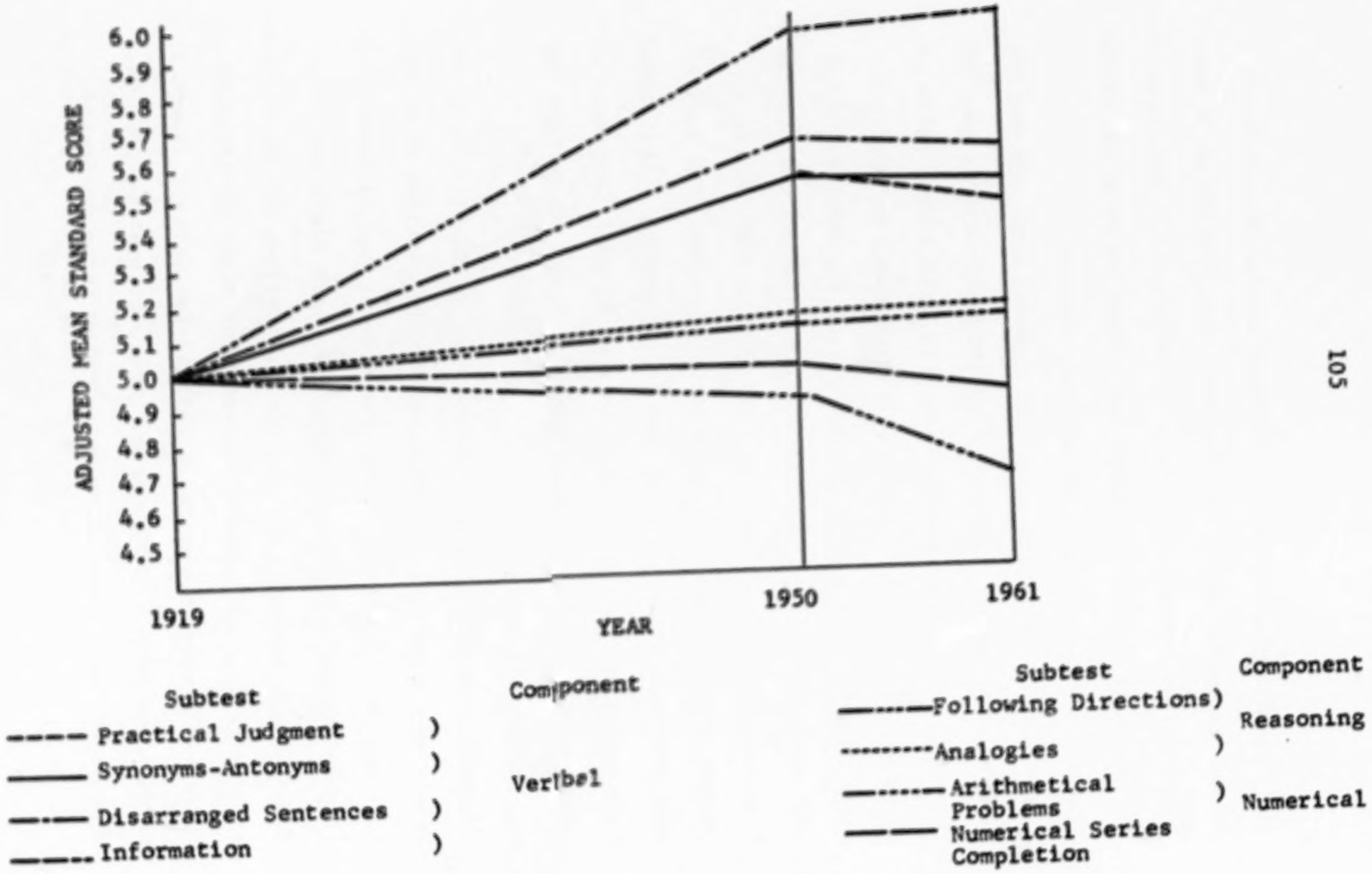

Fig. 13. Test performance trends for all subtests (adjusted means).

age. Application of these findings to the education of adults seems to imply that training for them would be most effective if communicated in a way which would call upon the use of their verbal abilities and stored information rather than upon numerical problem-solving ability.

Relevant data from this study reveal that age has not had the differential effect on individuals that it has had on functions or components of ability. This conclusion is supported by the fact that the 1950 variance on most subtests did not differ significantly from the corresponding 1919 variance. It is further substantiated by the finding that the direction of most of the 1950 to 1961 shifts in subtest variance were the reverse of corresponding 1919 to 1950 shifts. There were, of course, substantial individual differences in test scores at the time of each testing, but they were of about the same magnitude at age 60 as they had been at ages 50 and 19.

With respect to trait differences, Owens' (1953) earlier finding was that they remained remarkably constant from age 19 to age 50. Similarly, over the 11-year period from 50 to 61 there was no significant change in their magnitude. Table 9 does, however, contain one interesting bit of information. Overall, there was a tendency for trait differences to decrease slightly; in spite of this 52 individuals showed an increase and only 44 a decrease. Thus, it must be true that a few individuals contributed atypically large decreases.

Who these people are and what distinguishes them from their fellows is a subject for further investigation.

Antecedents of Aging Shifts

In view of the fact that the number of subjects in the present study was not large enough to permit the cross-validation of discriminating life history items, it was felt to be unusually important to attempt some form of analysis which would yield greater generalization of the findings. Two techniques were adopted for this purpose. The first of these was the classification of items via a sort into rational categories. The saturation of discriminating items within a category argues for the more general validity of items of the given type. The second technique consisted in factoring the relevant items. This method may also be thought of as establishing tentative item families, albeit arrived at empirically, the common substance of which should possess greater stability and generality than single item responses. Accordingly, these methods will be commented on in order.

Rational sort. The self-perceived experiences and personal characteristics of those individuals who most improved their test performances between the ages of 19 and 50 are listed in Table 28 by rational category. The number at the left of each description is the number of the item upon which that particular response implication

Table 28

Implications and Criterion Correlates of the Responses of Subjects Who Improved Their Test Scores from 1919 to 1950

Rational Category and Item Number	Response Implication	Criterion[a]
Early Experiences		
9.	Upset by a tragedy as a youth	V, R, T
55.	Father was only partially successful	N, T
50.	Only fairly well treated and happy at home	V
38.	Lived in a large city	N
56.	Parents were only nominally religious	N
56.	Parents were very religious	R
49.	Were allowed much independence at home	N
Physical Fitness		
13.	Tire no more rapidly than 10 years ago	V, N, R, T
12.	Typical day at work is less tiring than for the average person	V, T
14.	Exceptional physical vigor	N
16.	Health has never restrained activities	N
35.	Work has never been tiring	N
10.	Require no more than 7 hours sleep	N
1.	Weigh less than 155 pounds	R, T
109.	Accident has not interrupted activities	V, T
6.	Have never experienced major surgery	R
Education		
3.	Have been exposed to formal instruction within past five years	V, R, T
40.	Have had some graduate work	N, T

[a] V=Verbal component, N=Numerical, R=Reasoning, T=Total test.

(Table continued on next page)

Table 28 (Continued)

Implications and Criterion Correlates of the Responses of Subjects Who Improved Their Test Scores from 1919 to 1950

Rational Category and Item Number	Response Implication	Criterion[a]
Education (Continued)		
42.	Changed major in college	V, R, T
44.	Earned over ½ of college expenses	V, N, T
41.	College contributed markedly to life goals	N
46.	Did not apply abilities in college	V
46.	Did apply abilities in college	N
Occupational Endeavors		
107.	Income over $17,000 during 1960	N, R, T
82.	Able to save or invest a sizable portion of income	V, R, T
105.	Present job is high on the occupational scale	R, T
21.	Have surpassed job goals set at completion of college	N, R, T
115.	Work relatively long days	V, T
111.	Have held only one long term occupational position	N, R, T
19.	Have not changed occupations since leaving college	R, T
23.	Have held no long term jobs prior to the current one	T
110.	Have moved up the occupational hierarchy	R
33.	Frequently bring problems from home to work	N, R, T
24.	Prefer many projects "on the fire" simultaneously	N, R, T
26.	Desire autonomy on the job	V, T
34.	Are recognized for doing a job well	V, T
30.	Supervised several others on previous jobs	N
31.	Sometimes wish present job were more challenging	N
20.	At completion of high school, interested in many jobs	V
20.	At completion of high school, knew the kind of job desired	N

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[a] V=Verbal component, N=Numerical, R=Reasoning, T=Total test.

(Table continued on next page)

Table 28 (Continued)

Implications and Criterion Correlates of the Responses of Subjects Who Improved Their Test Scores from 1919 to 1950

Rational Category and Item Number	Response Implication	Criterion[a]
Adult Home and Community Life		
39.	Live in larger cities	N, R, T
81.	Hold over $25,000 life insurance	R, T
60.	Rent a house or apartment	V
60.	Own a house or apartment	N
112.	Mother lived to be old aged	V, T
Interests		
64.	Devote much time reading material related to work	V, T
66.	Spend at least 4 hours a week reading material related to work	V, T
66.	Spend less than 1 hour a week reading material related to work	N
59.	Have entertained friends only a few times a year	N, R, T
100.	Attend at least 3 movies a year	N
106.	Actively engaged in no social welfare activities	N
Personal Characteristics		
5.	At least half the Alpha items seemed familiar at the time of the 1961 testing	V, N, R, T
75.	Moderately religious	V, R, T
93.	Tell jokes frequently	V, N, R, T
90.	Recent past has been happiest period of life	V, R, T
99.	Frequently dissatisfied with self	V, T
80.	Not afraid to express opinions regardless of status of those who may differ	R, T
78.	Feel free to express views with associates	R, T
84.	Keep exact budget records	V, T
67.	Analytic reaction to music of a "classical music" concert	V, T
95.	Work somewhat faster than most people	R, T

[a] V=Verbal component, N=Numerical, R=Reasoning, T=Total test.

(Table continued on next page)

Table 28 (Continued)

Implications and Criterion Correlates of the Responses of Subjects Who Improved Their Test Scores from 1919 to 1950

Rational Category and Item Number	Response Implication	Criterion[a]
Personal Characteristics (Continued)		
68.	Reading speed is above average	N
85.	Have often had an idea that simply had to be written down	V, T
91.	Have never desired anything enough to go to great lengths to attain it	V, T
96.	Only slightly disturbed if something is left unfinished	N
98.	Considered by friends to be "quite curious" about the world	T
71.	Chief goal is somewhat changed from that of a few years ago	T
4.	Have taken or given in intelligence test within 5 years	N

[a] V=Verbal component, N=Numerical, R=Reasoning, T=Total test.

is based. The V, N, R, or T following each description indicates the criterion germane to that description (Verbal, Numerical, Reasoning, or Total score). Table 29 contains parallel response implications for those individuals who at least maintained their level of test performance between ages 50 and 61.

The pattern of these response implications for each rational category and each time period are summarized in Table 30. The summaries for the Occupational Endeavors, Adult Home and Community Life, and Personal Characteristics categories tend to be reversed in nature between time periods. There may be a tendency for those who have not pushed themselves on the job, and who have attained only moderate socio-economic success to be the ones who are best able to maintain their abilities or even to improve them after age 50. As can be seen in Table 10 on page 40, however, the correlations of the component difference scores across time periods were generally negative, ranging from -.23 for the Verbal component to -.47 for the Numerical. Corresponding correlations for the Reasoning component and Total are -.42 and -.25, respectively.

Regression effects and ceiling effects are undoubtedly responsible for much of this reversal tendency, although an estimate of the magnitude of the former suggested that it was not great relative to the primary effects (Kelley, 1963). It is, nevertheless, true that the second criterion segments

Table 29

Implications and Criterion Correlates of the Responses of Subjects Who at Least Maintained Their Test Scores from 1950 to 1961

Rational Category and Item Number	Response Implication	Criterion[a]
Early Experiences		
56.	Parents were very religious	N
49.	Were allowed very little independence at home	N
104.	Grew up with four or more brothers and sisters	N
Physical Fitness		
35.	Work has been moderately tiring	V
11.	Have occasionally turned down social engagements because of tiredness	N
17.	Usually ignore colds	R
Education		
40.	Have had some graduate work	V
41.	College contributed markedly to life goals	V
46.	Did not apply abilities in college	N
Occupational Endeavors		
107.	Income less than $7,000 during 1960	T
105.	Present job is relatively low on the occupational scale	R
115.	Work relatively short days	R
111.	Have held only one occupational position longer than 5 years	V
19.	Have worked at more than one occupation	R
110.	Have stayed the same or moved down the occupational hierarchy	R, T
33.	Frequently bring problems from home to work	V, N, T

[a] V=Verbal component, N=Numerical, R=Reasoning, T=Total test.

(Table continued on next page)

Table 29 (Continued)

Implications and Criterion Correlates of the Responses of Subjects Who at Least Maintained Their Test Scores from 1950 to 1961

Rational Category and Item Number	Response Implication	Criterion[a]
Occupational Endeavors (Continued)		
24.	Prefer to work at one project at a time	R, T
30.	Worked under supervision on previous jobs	R
20.	At completion of high school, knew the kind of job desired	V, T
32.	Do *not* socialize with fellow workers off the job	R, T
27.	Consider an ideal job one that allows interaction with people	N
36.	Have always had to push to keep work completed	N
Adult Home and Community Life		
60.	Rent a house or apartment	V, N, T
62.	Have lived with children or relatives for last 10 years	V, T
81.	Hold less than $10,000 life insurance	R
57.	Younger than 25 when first married	N
Interests		
64.	Devote much time reading material related to work	V
64.	Reading is limited to newspapers and magazines	R
66.	Spend at least 4 hours a week reading material related to work	V
101.	Frequently spend an evening reading	V, T
59.	Have entertained friends about once a week	N, R
63.	Thoroughly enjoy social gatherings	V, T
100.	Attend at least 3 movies a year	T
103.	Belong to 4 or more clubs	N
106.	Are actively engaged in at least 2 social welfare organizations	N, R

[a] V=Verbal component, N=Numerical, R=Reasoning, T=Total test.

(Table continued on next page)

Table 29 (Continued)

Implications and Criterion Correlates of the Responses of Subjects Who at Least Maintained Their Test Scores from 1950 to 1961

Rational Category and Item Number	Response Implication	Criterion[a]
Personal Characteristics		
88.	Fairly tense and nervous	V, N, T
99.	Frequently dissatisfied with self	N, T
83.	Plan activities precisely	V, N, T
96.	Only slightly disturbed if something is left unfinished	R
96.	Considerably disturbed if something is left unfinished	N
77.	There is some good in most people	V, R, T
80.	Hesitant to express opinions	R, T
78.	Reluctant to express views with associates	R, T
79.	Try hard to please people	N
76.	Have not become more religious with age	V, R, T
75.	Moderately religious	N
68.	Reading speed is above average	V
68.	Reading speed is below average	N
4.	Have not taken or given an intelligence test since last testing	R, T
85.	Have seldom had an idea that simply had to be written down	V
85.	Have often had an idea that simply had to be written down	N
86.	Have not taken advantage of all opportunities	V, N
89.	React immediately to an unpleasant situation	V, T
98.	Considered by friends to be "only moderately curious" about the world	N
71.	Chief goal is exactly the same as that of a few years ago	R
94.	Always complete attempted tasks but not as well as desired	R
93.	Seldom tell jokes	N
5.	At least half the Alpha items seemed familiar at the time of the 1961 testing	V

[a] V=Verbal component, N=Numerical, R=Reasoning, T=Total test.

Table 30

Summary of Response Implications of High Criterion Individuals

Category	Summary of Response Implications	Predominant Criterion
Early Experiences	Particularly sensitive to environment as a youth	1950-1919 V,T
Physical Fitness	Good health, physical vigor	1950-1919 N
Education	Education has been a significant portion of life space	1950-1919 V,N,T 1961-1950 V
Occupational Endeavors	Have kept the same job, worked hard, attained a high level of socio-economic success	1950-1919 R,T
	Have changed jobs occasionally, held jobs entailing a moderate amount of responsibility and strain, attained only moderate socio-economic success	1961-1950 R,T
Adult Home and Community Life	Live in larger cities, are at a high socio-economic level	1950-1919 R,T
	Moderate socio-economic status	1961-1950 V,R,T
Interests	Do a considerable amount of reading	1950-1919 V,T 1961-1950 V
	Active socially in welfare organizations	1961-1950 N
Personal Characteristics	Have self-confidence with regard to interpersonal relations and abilities in general	1950-1919 R,T
	Only moderate confidence with regard to interpersonal relations and abilities in general	1961-1950 R,T
	Analytic in approach to performing tasks and evaluating accomplishments	1950-1919 V,T

(1961-1950) probably constitute poorer criteria than the first for several reasons. (1) In spite of greater reliability, due in part to a shorter time span, the mean gain score over the second time period is of only about one-fifth the magnitude of that for the first time period. Thus, the hypothetical true gain scores have much greater variance for the first period. (2) Referring to Table 11, the probabilities of chance occurrence of the given numbers of discriminating items are clearly greater over the second time period, where they are high enough to imply that chance is probably a sufficient explanation. All-in-all, it seems that results based upon the first segments of the criterion (1919 to 1950) should be granted greater credence than those based upon the second (1950 to 1961).

To proceed, the summaries in Table 30 represent, in very general terms, the primary implications of the item responses by rational category. The data imply considerable consistency, by time period, both within and across rational categories. The Occupational Endeavors and the Adult Home and Community Life categories, for example, indicate that those with increments in test performance on both R and T from 1919 to 1950 report that they are at a high socioeconomic level. Likewise, the fact that reported educational experiences relate to increments on the Verbal component and Total is evidenced by responses from both the Education and Interests categories.

The summary table, in addition to containing evidence that there are consistently reported life history patterns, by rational category, also suggests that such patterns have a differential relationship to the various components of mental ability. It was those individuals with increments on the Verbal component who reported the higher incidence of educational experiences. Those with increments on the Numerical component were the ones reputedly most active and physically fit. Increments on the Reasoning component correlated with claims of high socio-economic status as well as with success and self-confidence in most endeavors.

Factor analysis. Turning now to the second technique for generalizing the findings, Factor II, Sensitive Intelligence, is undoubtedly the most useful of the five in predicting an overall increase in mental abilities. The only criterion unrelated to this factor in either time period was the Numerical component. The Reasoning component loaded highly on Sensitive Intelligence in both time periods and the Total and Verbal components loaded highly in the earlier period. It is not surprising that certain characteristics such as an interest in reading and verbal expression, a good memory, and ideas felt worth recording would be found to be predictive of an improvement in Total, Verbal, and Reasoning abilities. The finding which is more surprising and somewhat intriguing is that along with the more obviously test-related intellectual activities there is a response trend indicative of emotionality, compulsivity, and self-dissatisfaction which implies a motivational component. In a sense this may be viewed as constituting some objective and empirical verification of the rational position of such an investigator as Wechsler (1950).

Although the Reasoning component was related to Sensitive Intelligence in both time periods, the Total and Verbal components failed to show the same high relationship in the period from 1950 to 1961. Why should this be true? There seem to be two possible explanations. First, certain artifacts of measurement such as regression of scores, test ceiling, or lack of variance during the second time period may be causal. The second possibility is that this finding is a valid one and that factors other than Sensitive Intelligence were highly related to, and possibly responsible for, increases in the Total and Verbal criterion values in the later period. It is interesting to note that Verbal score did load high negative on Factor V, Egocentric Independence, and Total score loaded high positive on Factor IV, Introversion, in the later time period (1950 to 1961).

To attempt an interpretation, the increase in Verbal score from 1950 to 1961 can be regarded as highly related to the pole opposite Egocentric Independence; in other words, to unselfishness, dependence upon others for support and enjoyment, and humanitarianism. These characteristics surely imply more contact with other people than their poles, and thus more occasion to use the language and to maintain or enhance this use.

It is less understandable why an increase in Total score from 1950 to 1961 would be related to Factor IV, Introversion. One hypothesis is that the behavior of the introvert, that of disengaging himself from society for the purpose of more solitary and perhaps scholarly pursuits, has come to be regarded as less neurotic and more normal for the individual over 50 years of age. The consequence could well be that, if society is more tolerant and accepting of his behavior, the introvert is less anxious, and, as a result, better able to effectively channel his energies into worthwhile pursuits. Being increasingly alone is likely to lead to more reading, radio listening, TV watching, and to other potentially test-related activities, thereby accounting for the late increase in Total score.

The Total and Reasoning scores, 1919 to 1950, in addition to being highly related to Sensitive Intelligence, exhibited high loadings on Factor I, Socio-economic Success. The sensitive, intelligent individual, then, was not the only type found to substantially increase his Total and Reasoning scores during the early time period; also increasing them was the person who was an occupational and financial success, liked responsibility, had a high drive level concerning work, and desired the minimal external control present in a supervisory position.

The fact that life history items dealing with Socio-economic Success have a great deal of predictive value is supported in a study by Ferguson (1960) who found a set of items, which he collectively termed "economic maturity," to be of value in predicting success as a life insurance agent. Briefly put, "economic maturity" was a measure of the extent to which an applicant had progressed economically in relation to others of his same age group. It was based on items dealing with three areas: privately purchased life insurance, current living expenses, and past and present yearly earnings. From this brief description, it becomes clear that Ferguson's "economic maturity" is the essence of Factor I, Socio-economic Success.

It is not difficult to accept Socio-economic Success as a correlate of increases in mental ability test scores. Why it should be most closely related to gains on the Reasoning component and Total score is a bit more of a question. The fact that the Total score is more reliable than any of its components may constitute a partial explanation in its case. It may well be, in the case of the Reasoning component, that this type of test content is simply inherently more closely related to such practical and nonacademic criteria of success as occupational and financial status. Such a view seems eminently reasonable. On the other hand, the causal nexus is not easily unsnarled, and it may also be true that Socio-economic Success carries with it such test-correlated fringe benefits as more leisure for reading, for travel, and even for thinking.

As shown by the matrix of criterion intercorrelations of Table 10 and by Fig. 8, the Numerical component was the most independent of the criteria. It loaded highly on two factors that have received little attention to this point--Factor III, Physical Vigor, and Factor V, Egocentric Independence. The increase in Numerical scores was highly related to Physical Vigor in the first time period and to Egocentric Independence in both periods.

What exists within the composition of either, or both, of these two factors which would account for their high relationship to the Numerical component? The Physical Vigor factor describes an individual who does not tire easily, has good health, and possesses a great deal of self-confidence. His responses indicate an aggressive, determined approach toward life. The Egocentric Independent, on the other hand, is an individual who considers his own feelings before those of others, is not engaged in social welfare activities, prefers to work alone, has a tolerance for ambiguity, and is not dependent upon religion for a philosophy of life. He is a person who is highly self-reliant and perceives himself favorably. The overall pattern suggests an individual whose interests lie in the physical sciences or engineering areas rather than in the human sciences or humanities.

A clue to the significance of Factors III and V for numerical problem-solving may lie in the typical maleness of physical vigor, independence, and implied engineering-physical science interest. It is noteworthy that factorial studies such as those of Hobson (1947) and Havighurst and Breese (1947) both indicate that it is not at numerical manipulation that boys excel girls, but rather at solving problems with numbers. In comparable fashion, Witkin, Lewis, Hertzman, Machover, Meissner, and Wapner (1954) have noted the superiority of males at perceptual problem-solving and have added the revealing observation that this seems to be because males attack and manipulate the problem so much more aggressively and vigorously than females. In the author's words they are much less likely to show "passive-acceptance" of the situation. Thus it seems that high status on Factors III and V is typical of high psychological masculinity and that, as such, it has previously been found to be associated with success at numerical problem-solving. If to this is added the observation that a substantial number of the present subjects are engineers (a group of high occupational M-F), the entire issue seems greatly clarified.

Overall, the character of Factor II, Sensitive Intelligence, is such as to strongly imply the presence of a motivational component in the growth and development of verbal and reasoning abilities during the adult years. Similarly, Factors III and V, Physical Vigor and Egocentric

Independence, seem to argue for the efficacy of vigorous manipulation of the problem in the continued development of numerical problem-solving ability through early and middle adulthood. An interesting speculation concerns the extent to which these characteristics can be produced, or encouraged, by the educational system. It seems entirely possible that some "divine discontent" could be induced in many students by stressing the vistas which lie before us and how small that fraction of knowledge which we possess is in relation to the total. Comparably, it seems that vigorous manipulation of quantitative problems could be encouraged by stimulating trial and error behavior in the search for a solution, and that it would be discouraged by an emphasis upon the more or less uncomprehending or mechanical application of a procedure priorly judged to be appropriate.

Application of Alpha and LEI Results to Specific Hypotheses Regarding Age Shifts

Organic deterioration. Early decline functions are generally considered to be those most sensitive to decrements in neural efficiency. Jones (1959) reviews studies, based upon cross-sectional data, which indicate that verbal ability generally "holds," at least through the fifties, and that arithmetic reasoning decreases slightly with age. He also states that symbol-series, digit-symbol completion, verbal analogies, and number series completion decline sharply. With this conception of the differential effect of age upon various functions, attempts have been made to detect abnormal intellectual deterioration from a pattern of changes in test scores (Inglis, 1958). Some form of discrepancy between verbal score and reasoning or performance score is generally used as the index.

The present study contains no medical data regarding the subjects to affirm or deny the fact of organic deterioration. However, if it be assumed that age is ultimately a carrier of such deterioration, then the present findings are germane to the problem. In substance, they imply that the functions which have classically been assumed to decline most sharply may not be entirely correctly identified.

Thus, (1) Analogies did not decline sharply but was a "hold" function, if hold means to remain relatively constant over a period of time. (2) It was the Numerical component that did decline (from 1950 to 1961). (3) Within the Numerical component, it was Arithmetical Problems rather than Number Series Completion that declined most sharply. (4) There is some evidence herein which implies that the decline in Arithmetical Problems _is_ related to organic deterioration. As will be indicated in what follows, it is _not_ reasonable to attribute this decrement to undue speeding. In addition, there was a highly consistent, positive relationship between the Physical Vigor life history factor and increments in or maintenance of performance from ages 19 to 50 on the Arithmetical Problems subtest. Thus, the present data provide several bases for real doubt regarding the validity of the assumption that reasoning abilities, such as those represented by verbal analogies, really constitute the function most sensitive to decrements in neural efficiency. An alternative explanation for the apparent shift in analogies score, if based upon cross-sectional evidence, appears herein under the heading of cultural change.

Use-disuse. It was planned to evaluate the hypothesis that less practiced mental functions are more susceptible to decrements with age than are more practiced ones, sometimes called the use-disuse hypothesis, by employing data from the two ranking items in Part 1 of the LEI. On one item the subjects were asked to rank as many of the subtests as they could on the basis of their familiarity with the content. On the second they were asked to rank order all the subtests on the basis of their estimated performance. The analysis was begun by ranking the actual scores on each subtest for each individual. Rank order correlations were then computed (for each subtest) between actual performance and estimated familiarity. None of the correlations was significant. The highest one was .12. There was a tendency on several subtests for the subjects to assign the same rank to both familiarity and estimated performance. The rank order correlation between estimated and actual performance, however, was less than .20 on four of the subtests. Very possibly the assumption that the subjects could rank order the subtests on the basis of familiarity with the content was an unrealistic one. At any rate, these two items provided no evidence to indicate that the extent of familiarity with the type of material in a subtest is related to performance on that subtest.

Cultural Change

It seems probable that relatively recent temporal changes in our society with respect to such variables as transportation, communications, and educational practices have some more or less substantial affects upon test performance. To the extent that they impinge differentially upon groups of differing ages, they may differentially affect test performance as well. The issues have been well stated by Kuhlen (1940). For example, if the use of standardized tests is more common now than it was 50 years ago, then current high school graduates should outscore those who graduated a half century ago on the basis of test familiarity or sophistication alone, ability constant. If so, then culturally conditioned changes are mistakenly identified as age changes. Obviously, the longitudinal study is as susceptible to spuriousness here as the cross-sectional, since comparable changes in test scores over two successive and equal periods are clearly contingent upon a constant rate of cultural evolution in test-score-related variables.

In this context it was felt that it would be highly desirable to attempt to estimate the extent to which cultural changes had contributed to the substantial overall increments in the Alpha scores of the present subjects between 1919 and 1961. To accomplish this it was decided to administer the same examination to a random sample of 101 male freshman of 1961-1962 at the same institution, Iowa State University. It can, of course, be argued that past and present freshmen are not comparable on other than cultural bases. For example, differential birth rate and a smaller selection ratio both argue for the probable superiority of the freshmen of 1919. On the other hand, more selection via objective tests and the reduction of economic restraints argue for the superiority of the 1961-1962 sample. Faced with these imponderables, it seems most reasonable to infer that basic differences between the two temporal groups are minimal and that changes in mean score do largely reflect culturally conditioned differences in the character of test-related background.

Table 31 contains a comparison of the performances of the samples of 1919 and 1961. These are listed in descending order beginning with the subtest upon which the 1961 freshmen outscored the 1919 freshmen by the greatest amount.

To obtain evidence regarding the probable extent to which the hypothesized cultural changes are related to the generally superior performance of the 1961 freshmen, eight

Table 31

Differences Between 1961 Freshmen and 1919 Freshmen in Alpha Subtest and Total Scores

Subtest	Component	$\overline{X}_{1961}-\overline{X}_{1919}$	P
7. Analogies	R	.904	$<.01$
5. Disarranged Sentences	V	.875	$<.01$
6. Number Series Completion	N	.626	$<.01$
Total Score		.440	$<.01$
3. Practical Judgment	V	.183	$<.05$
1. Following Directions	R	.030	$>.05$
4. Synonym-Antonym	V	.002	$>.05$
8. Information	V	-.026	$>.05$
2. Arithmetical Problems	N	-.305	$<.01$

Norm Mean = 5; Standard Deviation = 1.

graduate students in Industrial Psychology estimated the extent to which they thought such changes would affect performance on each subtest. They did this by assigning each subtest a score from zero to three representing their judgment of no affect to a large affect. A rank order correlation was then computed between the 1961 minus 1919 freshmen scores on each subtest and the judges pooled ratings. The correlation was .74 which is significant at the .05 probability level (Siegel, 1956). The magnitude of this correlation indicates that the subtests which were relatively easier for the 1961 freshmen are the same ones rated as most affected by culture. The extent of this association is further evidenced by the fact that the four subtests upon which the 1961 freshmen scored significantly higher were the four given the highest rating for probable "cultural inflation."

It is, of course, not possible to specify for the subjects of the longitudinal study the precise proportion of the increment in their test scores to be attributed to the greater "buoyancy" of an enriched culture. It may be noted, however, that the freshmen of 1961 outscored them on the total test by about 0.44 sigma as compared with an overall, mean temporal gain for the older subjects of 0.55 sigma for the period from 1919 to 1950. It is surely implied that cultural changes figured prominently in these gains, and that the Analogies, Disarranged Sentences, Number Series

Completion, and Practial Judgment subtests were especially benefitted.

General and Continuing Problems in the Study of Changes in Mental Abilities with Age

It should not be implied, of course, that the mere use of the longitudinal method eliminates all major problems or sources of error involved in the attempt to appraise the relationship of mental ability to age. For example, it would have been desirable to employ as vehicle some test which samples mental abilities more widely and parsimoniously than Alpha. However, only Alpha was available at the time of the initial testing, and the longer the backward time span involved the more primitive the original test must necessarily be. Equation of Alpha with some more nearly optimal current instrument is clearly a possibility; however, it is just as clearly circumscribed by our inability to achieve accurate differential prediction of even identical component scores over time (Tyler, 1953). Certain other problems are briefly treated in what follows. Although this is done in the context of a longitudinal study, many of the same issues would arise, recast, had the cross-sectional method been the one employed.

Problems of sampling. To illustrate the above contention, the cross-sectional problem of obtaining comparable samples of populations at successive ages can be solved by using the longitudinal approach. Use of this method, however, involves a similar problem, that of attrition of the sample. The subjects who are not retested on successive follow-ups are most likely to be the poorer performers. Also, as the subjects become older, attrition of the sample may become excessive.

This entire sampling problem becomes less significant if one can estimate its probable affect on the results with reasonable accuracy. Table 32 contains a classification of the subjects of 1950, real and potential, subsequent to the 1961 administration. Except for those who died, very few were lost. To obtain some indication of what their performances would have been had they been retested, the 1950-1919 difference scores of the 31 "lost" subjects were compared with the corresponding difference scores of the same period for the subjects who were retested in 1961. This was done for the scores of each component and the total. The results, contained in Table 33, indicate no significant discrepancy between the mean difference scores of the two groups. Rather, they suggest that the 1961 scores of the 31 individuals not tested probably would have been very similar to those of the 96 who were retested. Since the loss of subjects was much more on a health and less on a motivational basis than previously, this outcome seems entirely reasonable.

Table 32

Classification of the 1950 Subjects after the 1961

Test Administration

Classification		Number
Total subjects in 1950		127
Tested	96	
Deceased	13	
Noncooperating	8	
Disabled	5	
Address unknown	5	

Table 33

Total and Component Alpha Difference Scores of Tested and Untested Subjects (1950-1919)

Component	$\bar{D}_T$	$\bar{D}_U$	t	P
Verbal	.631	.679	.02	>.05
Numerical	-.059	-.151	.77	>.05
Reasoning	.150	-.035	1.23	>.05
Total	.583	.447	1.49	>.05
	n = 96	n = 31		

Norm Mean = 5; Standard Deviation = 1.

Motivation of the subjects. A valid comparison of test-retest scores is also dependent upon approximately maximum performance on the part of the subjects at the time of each testing. The results of many cross-sectional or sampling studies have been questioned on the basis that this assumption was not met.

It seems reasonable to believe that the subjects of the present study were well motivated at the time of their initial testing in 1919. At that time testing was a novelty, and Alpha had earned a reputation for being valuable in military selection and classification. When the freshmen took the test in 1919 they were told that from it could be predicted their approximate grade-point average and the general level they might attain in the occupational hierarchy (Owens, 1953).

The same author cites evidence to indicate that the subjects were also well motivated at the time of the 1950 testing. Similarly, there is reason for assuming good motivation in 1961. For example, all but three of the subjects indicated on the final question of the LEI their desire to have the Alpha results sent to them; they appeared to be proud of their role in the longitudinal study and challenged by the opportunity to show that test performance does not decrease with age. The indifference often attributed to older people in a testing situation did not prevail in this instance.

Retest effect. There is always a possibility that test performance in a longitudinal study is enhanced by a retest effect. This problem can become crucial if the time span between testings is relatively short. However, Helmstadter (1950) found that an immediate retest on parallel forms of the Alpha resulted in an increment of only 16 raw score points or about one-half a standard deviation. This increase was, in all probability, largely due to the recall of identical instructions and similar contexts and only secondarily to the acquisition of more general "test taking" skills. Undoubtedly there was some retest increment in the 1961 Alpha scores, but the forgetting function being what it is, the 11-year span involved probably reduced sheer recall to near zero, and it seems unlikely that test-taking skills alone would have raised the performance level appreciably.

A related problem that is of concern in both longitudinal and cross-sectional studies is that of ceiling effect. A more recent study by Owens (1959) indicates that the ceiling on Alpha was not conspicuously too low for the present subjects.

Speed power. In any study of the relationship of mental ability to age, it is clear that the nature of the measuring instrument selected has a bearing upon the outcome obtained. An aspect of this larger problem involves the question of the relative premium placed upon intellectual speed vs. power by the particular test selected. Lorge (1936) recognized and indicated the critical nature of this problem some time ago.

In terms of the differential performances of younger and older subjects on speeded and unspeeded tests he developed a correction for speeding which, when applied to the data of Miles and Miles, wiped out the declines with age reported by these authors.

Since the performances of the present subjects revealed no significant decrements from 1950 to 1961, the speed-power issue revolves only about the question of whether increments or decrements in Alpha score were associated with increases or decreases in the speed requirements of the content. To estimate this latter it was decided in advance to give the examination on both a standard time and a double time basis. Following the method of Helmstadter and Ortmeyer (1953), omits during the timed administration were adopted as an index to speeding and errors during the double-time administration as an index to power. Subtracting the latter from the former, subject by subject, yields a distribution of scores which can then be tested directly for the significance of the difference between their mean and that of a distribution with mean zero.

Helmstadter and Ortmeyer (1953) applied this procedure to the scores of the 127 subjects tested in 1950 during the first phase of this longitudinal study. Since directions for subtest 1 are given orally for each item and the subject is given adequate time to respond, there was no "unspeeded" administration for that subtest. As indicated in the second column of Table 34, these earlier investigators found that Information was primarily a power test and that Practical Judgment, Synonym-Antonym, and Analogies were primarily speed tests. The third column of Table 34 shows the speed-power composition of the subtests for the 1961 administration. Overall, as might have been anticipated, it appears that Alpha was more of a speed test for these subjects in 1961 than in 1950. It seems logical to assume, then, that their 1961 mean score was not quite as high as it would have been had they not been pushed for time.

However, it should be observed that aging affected the speed-power balance of the several types of content somewhat differentially. In addition, it may be noted that the subtest which showed the largest decline from 1950 to 1961 became more powered over that same period, with the clear implication that this loss was in intrinsic ability and not in speed.

Table 34

Speed and Power Indices on the Army Alpha Subtests

Subtest	Speed-Power Composition (1950)	Speed-Power Composition (1961)
3. Practical Judgment	S S[a]	S S
7. Analogies	S S	S S
4. Synonym-Antonym	S	S S
6. Number Series Completion		S
5. Disarranged Sentences		
2. Arithmetic Problems		P
8. Information	P P	P P

[a] S S = Speeded, "t" significant at .01.
S = Speeded, "t" significant at .05.
P P = Power, "t" significant at .01.
P = Power, "t" significant at .05.

SUMMARY AND CONCLUSIONS

The purposes of this study were: (1) To estimate the effects of a 11-year age increment upon eight measurable mental abilities; (2) to estimate the effect of the given age increment upon individual differences and trait differences in these particular mental abilities; and (3) to reveal, via the scored life history, patterns of living which are typical of those whose mental abilities age has treated more kindly and less kindly.

Ninety-six subjects, who had been given the Army Alpha examination in 1919 and 1950, were retested in 1961. In addition to Alpha, these subjects were given a 228-item "Life Experience Inventory." The average age of the subjects was 19 years in 1919.

The subtests of Alpha, also utilized independently, were combined into three components--Verbal, Numerical, and Reasoning--these, along with Total score, served as parsimonious measures of intellectual performance in the analysis of the life history items. The eight criteria employed were difference scores for the three components and Total score over two time periods, 1919 to 1950 and 1950 to 1961.

Of the 113 noncontinuous-type life history items only approximately a chance number validated, and these items were therefore dismissed from further consideration. However, of the 115 continuous-type items, 82, which on the average discriminated at the 10 percent probability level, showed significant correlation with one or more of the criteria. An attempt was made to generalize the meaning and significance of these items in two ways: First, through a rational sort into apparent content categories so that the saturation of significant items could be determined; and, second, through factoring the matrix of item and criterion correlations.

The results can be most easily reviewed by classifying them in two ways, (1) those involving mental ability and (2) those involving the life history correlates of changes in mental ability. The findings relating to the former can be summarized as follows:

1. There were no significant changes in subtest scores or Total score from age 50 to age 61. There was, however, a significant decline on the Numerical component.

2. There were no significant changes in the magnitudes of either individual differences or trait differences from age 50 to age 61.

The results of the analysis of the life history items can also be divided into two sections, one dealing with the rational sort and the other with the factor analysis.

Rational sort. The discriminating life history items were classified, according to their apparent content, under the following topical headings.

1. Early Experiences
2. Physical Fitness
3. Education
4. Occupational Endeavors
5. Adult Home and Community Life
6. Interests
7. Personal Characteristics

It is pertinent to note that the Education, Occupational Endeavors, and Interests categories rate highly in terms of the saturation of significant items in the total of that type.

Factor analysis. The 82 significant life history items and the eight criterion variables were factor analyzed using the principle axes method. Twenty factors were extracted and their latent roots plotted. Both five and nine factors were rotated to oblique simple structure using a biquartimin criterion. Eight judges independently assigned names to the factors.

The five factor rotation was found to be the more interpretable of the two and was the one finally employed. The factors tentatively identified were (1) Socio-economic Success, (2) Sensitive Intelligence, (3) Physical Vigor, (4) Introversion, and (5) Egocentric Independence. Although the rotation program was designed to permit an oblique solution, the correlations between the factors were so low as to render them nearly orthogonal.

When the criteria were profiled on the factors in terms of their loadings, the following patterns of relationships became apparent.

1. A life history pattern of Socio-economic Success was highly related to a better than average maintenance of Total and Reasoning scores from age 20 to age 50.

2. A life history pattern of Sensitive Intelligence was highly related to a better than average maintenance of Total, Verbal, and Reasoning scores from age 20 to 50, and to Reasoning score from age 50 to 60.

3. A life history pattern of Physical Vigor was highly related to a better than average maintenance of Numerical score from age 20 to 50.

4. A life history pattern of Introversion was highly related to a better than average maintenance of Total score from age 50 to 60.

5. A life history pattern of Egocentric Independence was highly related to a better than average maintenance of Numerical score from age 20 to 50 and 50 to 60; it was also related to a failure to maintain Verbal score from age 50 to 60.

Implications

1. Since Total Alpha score did not change significantly from the subjects' ages 50 to 61, it is implied that programs like adult education, posited on the continued intellectual

competence of persons through this age range, are on firm ground.

2. Several implications follow from the fact that age had a differential affect upon Verbal, Reasoning, and Numerical component scores which showed an increase, constancy, and a decrease, respectively, from 1919 to 1961.

   a. If an "age-free" test for the adult years were desired, some sampling of reasoning functions would be most likely to provide it.

   b. If one were concerned with diagnosing "psychometric age," a discrepancy between verbal and numerical abilities would provide the best index to it.

   c. In training adults a cognitive appeal through verbal channels would utilize their most age-favored ability.

   d. Insofar as mean shifts in abilities are concerned, the most appropriate jobs for adults would be those which place increasing premium upon verbal abilities and a decreasing premium upon numerical.

3. Since individual differences do not appear to increase with age, it is not to be expected that age will treat the initially more able any more kindly than the initially less able.

4. Since trait differences do not shift with age, it must not be assumed that age will treat more kindly those functions which are practiced, in an occupation or elsewhere, such as the numerical skills of an accountant.

5. Overall, since there are many more significant life history correlates of age changes in mental abilities than could reasonably be attributed to chance, it is implied that experiential patterns of living do play a significant role in at least this aspect of the aging process.

a. In terms of the saturation of discriminating items in the totals of this type, it is implied that the life history areas of Education, Occupational Endeavors, and Interests are particularly important.

b. In terms of the factorial analysis of discriminating life history items the following seem to be the clearest and most important implications.

(1) Intelligence, accompanied by some emotional-motivational component involving youthful trauma, tenseness, and perseveration, and self-dissatisfaction argues for an increase in Total, Verbal, and Reasoning scores to age 50 and for a further increase in Reasoning through age 61.

(2) Physical Vigor, accompanied by Egocentric Independence, argues for an increase in Numerical score through age 61. It may well be that vigorous manipulation of the problem constitutes a linkage between physical health and problem-solving ability.

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APPENDIX A

LIFE EXPERIENCE INVENTORY

LIFE EXPERIENCE INVENTORY

SECOND IOWA STUDY

Part I Questions on the Alpha Examination

Part II Multiple choice questions--check only one alternative

Part III Multiple choice questions--check all alternatives that apply

Part IV "Fill-in" responses

Part I

Questions on the Alpha Examination

Listed below are the sub-test names and types of items included in the Alpha test. Under column A please rank in order as many of these sub-tests as you felt somewhat familiar with by virtue of your occupation or hobbies (For example, an accountant would probably rank the Arithmetical Reasoning Test as 1.). In addition, we would like to know, relatively, how well you think you did on each sub-test. Please indicate this, under column B, by ranking them all from 1 (best) through 8 (poorest).

Sub-tests and Items	Familiarity A	Performance B
Following Directions ○ ○ ○ ○ ○	___	___
Arithmetical Reasoning How many are 5 men and 10 men?	___	___
Common Sense Why do we use stoves? Because __ they look well __ they keep us warm __ they are black	___	___
Synonym - Antonym good - bad --------------same - opposite	___	___
Disarranged Sentences a eats cow grass ---------true-false	___	___
Number Series Completion 2 4 6 8 10 12 __ __	___	___
Analogies dog: bark = cat: ________ chair mew fire house	___	___
Information People hear with the eyes ears nose mouth	___	___

Part II

Multiple Choice Questions

Check only one alternative

What is your present marital status?
__ 1. single
__ 2. married, no children
__ 3. married, one or more children
__ 4. widowed
__ 5. separated or divorced

What is your weight?
__ 1. under 135 pounds
__ 2. 136 to 155 pounds
__ 3. 156 to 175 pounds
__ 4. 176 to 195 pounds
__ 5. over 195 pounds

What is your height?
__ 1. 5' to 5'4"
__ 2. 5'5" to 5'7"
__ 3. 5'8" to 5'10"
__ 4. 5'11" to 6'1"
__ 5. 6'2" or over

How long has it been since you have been exposed to any formal instruction? (short course, extension course, correspondence course, refresher course, et al.)
__ 1. less than 1 year
__ 2. less than 5 years
__ 3. less than 10 years
__ 4. not since college

How long has it been since you have taken (or given) an intelligence test?
__ 1. within 2 weeks
__ 2. within 2 months
__ 3. within 2 years
__ 4. within 5 years
__ 5. the time of our last testing

How many items in the Alpha examination seemed familiar to you as you repeated it?
__ 1. only 2 or 3
__ 2. perhaps 1/10th
__ 3. perhaps 1/4th
__ 4. about 1/2
__ 5. most all of them seemed familiar

Did you, after our last testing, look up the answers to any of the test items?
__ 1. Yes
__ 2. No

Check only one alternative

How many times have you experienced major surgery?
__ 1. 0
__ 2. 1
__ 3. 2
__ 4. 3
__ 5. 4 or more

Have you ever been hospitalized more than one week as the result of any kind of accident?
__ 1. Yes
__ 2. No

How would you evaluate your health?
__ 1. very good--much better than other people's
__ 2. quite good--somewhat above average
__ 3. about average
__ 4. somewhat poorer than average
__ 5. very poor health--source of considerable concern

How much weight have you gained or lost in the last 5 years?
__ 1. lost more than 5 pounds
__ 2. lost up to 5 pounds
__ 3. my weight stays about constant
__ 4. gained up to 5 pounds
__ 5. gained more than 5 pounds

As a youth, were you ever so upset by some tragedy that you brooded for some time over the meaning of life?
__ 1. Yes
__ 2. No
__ 3. I've been upset, but seldom brooded over it

On the average, how much sleep do you require to feel good?
__ 1. less than 5 hours
__ 2. 5 to 6½ hours
__ 3. 6½ to 7 hours
__ 4. 7 to 8 hours
__ 5. more than 8 hours

During most of your adult life, have you had as much sleep as you require to feel good?
__ 1. Yes
__ 2. No

Which of these common complaints most often bothers you? (Check one)
__ 1. inability to sleep
__ 2. poor digestion
__ 3. headaches
__ 4. "jumpiness"
__ 5. shortness of breath
__ 6. poor vision or reading ability
__ 7. irritability
__ 8. difficulty in hearing

Check only one alternative

During the last full calendar year, how often have you had to turn down, c
break, a social engagement because you were tired?
__ 1. never
__ 2. rarely
__ 3. occasionally
__ 4. frequently

Does a typical day at work tire you out?
__ 1. much more than the average person my age
__ 2. somewhat more than the average person my age
__ 3. somewhat less than the average person my age
__ 4. much less than the average person my age

Do you tire more rapidly than you did 10 years ago?
__ 1. yes, much more rapidly
__ 2. yes, a little more rapidly
__ 3. no, I don't notice any real difference

Over the last 10 years, how would you characterize your physical vigor?
__ 1. exceptional
__ 2. good
__ 3. average
__ 4. poor
__ 5. very poor

At what stage in your life has your physical health been best?
__ 1. preschool years
__ 2. grade school years
__ 3. high school and college years
__ 4. adult life
__ 5. just recently

In looking back on your childhood, what distressed you most? (Check one)
__ 1. physical illness
__ 2. feeling not wanted by parents or parent
__ 3. feeling not wanted by schoolmates
__ 4. feeling not wanted by teachers
__ 5. failure in some activity or thing in which I especially wanted to succeed.
__ 6. none of these

When are you most likely to have a headache? (Check one)
__ 1. when I am trying hard to do something right
__ 2. after one of "those" nights out
__ 3. after driving or looking at a strong glare during the summer
__ 4. when I don't get to eat on time
__ 5. any time, there doesn't seem to be any particular cause
__ 6. never have any

Has your health kept you out of activities or out of the company of people
you think you would have enjoyed?
__ 1. often
__ 2. sometimes
__ 3. rarely
__ 4. never

Check only one alternative

When you have a cold, do you usually (Check one)
__ 1. stay home in bed
__ 2. see a physician
__ 3. take home remedies
__ 4. stay on the job, but take it easy
__ 5. ignore it

What is your present attitude toward your health?
__ 1. I never think about it
__ 2. I consider it only to the extent of obtaining an annual physical examination
__ 3. It concerns my family, but not me
__ 4. It causes me only occasional concern
__ 5. It is of considerable concern to me

In your work life, have you
__ 1. worked at the same job without much change since I left college
__ 2. changed jobs occasionally, but stayed in the same occupation
__ 3. tried several different occupations
__ 4. worked at one occupation most of the time, with occasional periods at some other activity

By the time you finished high school, how did you feel toward your life's occupation?
__ 1. knew what I wanted in the way of a job and have not changed my mind
__ 2. thought I knew what I wanted but have since changed my mind
__ 3. had some idea of what I wanted to enter
__ 4. had little or no idea of what I wanted to enter because I was interested in many things
__ 5. had little or no idea what I wanted to enter because few things interested me

Relative to the goals you had when you left college, your life's work:
__ 1. has surpassed those goals
__ 2. has fulfilled those goals
__ 3. has not been as good work as I had hoped for
__ 4. has been unrelated to my goals but satisfactory
__ 5. has been unrelated to my goals and unsatisfactory

How old were you when you got the job that really started you on your way?
__ 1. 19 to 21
__ 2. 22 to 25
__ 3. 26 to 30
__ 4. 31 or over

Your average length of service in all your previous full-time jobs was:
__ 1. less than one year
__ 2. one to two years
__ 3. three to four years
__ 4. five to six years
__ 5. seven to eight years
__ 6. nine to ten years
__ 7. more than 10 years
__ 8. no previous jobs

Check only one alternative

How long have you been working at your present job?
___ 1. less than one year
___ 2. less than five years
___ 3. less than ten years
___ 4. more than ten years
___ 5. more than 20 years

For what reason did you choose the particular field you are now in (Check one
___ 1. interest in this area
___ 2. personal qualifications
___ 3. influence of parents, friends, or relatives
___ 4. family enterprise
___ 5. opportunities available in this field
___ 6. none of the above

What has been your most important reason for desiring to change any job you have held in the past?
___ 1. to do more interesting work
___ 2. to have more likeable associates
___ 3. to increase my pay
___ 4. to make better use of my training and experience
___ 5. none of the above

What is most important to you in a job? (Check one)
___ 1. that it be absorbing and worthwhile
___ 2. that it pay reasonably well
___ 3. that the working situation be pleasant from day to day
___ 4. that my efforts be appreciated and rewarded
___ 5. that I respect and trust my superiors
___ 6. that I be my own boss
___ 7. that the job title carry some prestige
___ 8. that I be able to spend some time with my wife and/or family
___ 9. something else

Generally, in your work, would you prefer:
___ 1. to work at one thing at a time
___ 2. to work on two or three things at a time
___ 3. to have many things "on the fire" simultaneously

On which one of the following features of your job would you like to be able to spend more time?
___ 1. listening to new ideas
___ 2. keeping things in their place
___ 3. passing on detailed information to others
___ 4. getting to really know the people with whom I work
___ 5. correcting errors as they are made
___ 6. not employed

What is the most important characteristic of jobs you have liked? (Check one)
___ 1. the kind of work I actually did
___ 2. the amount of money I could make
___ 3. what others think of people who do this job
___ 4. the security the job gave me
___ 5. the opportunities for advancement which it provided

Check only one alternative

In a job would you--
___ 1. like to have a good deal of responsibility
___ 2. like to have some responsibility, but still have someone responsible over me
___ 3. prefer a minimum of responsibility
___ 4. rather not have any responsibility

If you could work on what you would consider an ideal job, you would:
___ 1. work entirely autonomously
___ 2. work under only suggested priorities
___ 3. expect to be told what to do, but not how to do it
___ 4. expect to be told what to do and receive suggestions as to how to do it
___ 5. expect to be told what to do and how to do it

Your choice of an ideal occupation would be one which
___ 1. allowed a great amount of interaction with other people
___ 2. would require working with a small group
___ 3. would allow me to work closely with one other person
___ 4. would allow me to work by myself

The type of work which interests you most is work that
___ 1. has much fine detail involved
___ 2. has some fine detail aspects
___ 3. very seldom requires fine detail work
___ 4. would never require me to bother with fine details

How do you feel about jobs requiring many routine operations, calculations, etc?
___ 1. rather enjoy routine once I get the hang of it
___ 2. do not mind them once in a while
___ 3. indifferent, take it or leave it
___ 4. dislike them but would take one if necessary or advantageous
___ 5. would not take one under any circumstances

Looking back, how do you feel about the amount of time you have spent socially with persons above you in the organization?
___ 1. much too much
___ 2. a little more than I really wanted
___ 3. about right
___ 4. not enough
___ 5. never worked in a large organization

In your previous jobs, which best describes your experience?
___ 1. worked independently, with no supervision
___ 2. worked under supervision, but did not supervise others
___ 3. supervised one or two others
___ 4. supervised three or more others

From your past experience, which one of these factors do you feel has been the most important for your success?
___ 1. ability to get along with co-workers
___ 2. ability to get along with supervisors
___ 3. ability to organize details of work
___ 4. skills and experience
___ 5. something else

Check only one alternative

In your previous job(s) about how much of your working time did you spend with people higher up in the company or organization?

__ 1. less than 1/4
__ 2. 1/4 to 1/2
__ 3. about 1/2
__ 4. 1/2 to 3/4
__ 5. over 3/4
__ 6. have never worked in a large organization

Which item best describes the routine paper work of your past jobs?

__ 1. a lot, but I put up with it
__ 2. a lot, and something should have been done to reduce it
__ 3. a lot, but most of it was really necessary
__ 4. I rather enjoyed it
__ 5. my jobs have entailed very little paper work

Which one of these has given you the least difficulty on any job you have held?

__ 1. lack of friendliness of fellow workers
__ 2. not being as fast as other workers
__ 3. not knowing the job well
__ 4. the boss' criticism
__ 5. not liking the nature of the work
__ 6. none of these

To what degree do you feel that your most recent job makes or made use of your abilities and capacities?

__ 1. sometimes feel inadequate for the job
__ 2. feel stimulated and challenged by my work
__ 3. sometimes wish the job were more difficult and challenging

In your organization, which one of these applies most?

__ 1. there is too much time wasted
__ 2. there is not enough loyalty to the organization
__ 3. there are too many people bluffing their way along
__ 4. there are too many people who haven't enough drive
__ 5. there are too many people just interested in their own individual advancement
__ 6. do not work for an organization

About how often do you get together after hours with some of the people with whom you work?

__ 1. not at all
__ 2. about once a month
__ 3. about twice a month
__ 4. 3 to 6 times a month
__ 5. 7 or more times a month

Do you find yourself bringing problems from home to work?

__ 1. frequently
__ 2. occasionally
__ 3. seldom
__ 4. never

Check only one alternative

Which one of the following have you disliked most in jobs that you have held?

__ 1. job had no real future
__ 2. the working situation was unpleasant
__ 3. pay was inadequate
__ 4. I had limited confidence in my superiors
__ 5. job did not offer enough security
__ 6. I was never really challenged by the job
__ 7. none of the above

How much recognition do you receive for doing a good job?

__ 1. none at all
__ 2. occasionally a good job is recognized, but not often
__ 3. about as much as anyone else
__ 4. as much as is deserved
__ 5. sometimes more than is deserved

In connection with your work, in which one of these have you taken most pride?

__ 1. having been able to avoid any major controversies
__ 2. having gotten where I am on my own merits
__ 3. having provided a lot of new ideas, good or bad
__ 4. having been able to work smoothly with other people
__ 5. having been able to do well whatever management has requested

Through your adult life, how tiring has your work been?

__ 1. very tiring--exhausting!
__ 2. moderately tiring
__ 3. I only occasionally felt tired
__ 4. I never thought about being tired

What is your feeling about the pace of the jobs you have held?

__ 1. I've always had time to spare
__ 2. I've been reasonably busy, but never pushed
__ 3. I've felt crowded and extended only occasionally
__ 4. I've always had to push quite hard to get everything done
__ 5. I've always been loaded with more than I could possibly do

Have you spent most of your adult life in a place where:

__ 1. my surroundings were entirely congenial and satisfactory
__ 2. I was fairly well satisfied
__ 3. conditions were tolerable
__ 4. conditions were somewhat unsatisfactory
__ 5. I more or less constantly wanted to move

In what section of town did your family live longest while you were growing up?

__ 1. lived in one of the most exclusive sections of town
__ 2. lived in a good section but not the best
__ 3. lived in an average section of town
__ 4. lived in one of the poorer sections of town
__ 5. lived in a rural area

Check only one alternative

In what section of town did you live during most of your adult life?
__ 1. lived in one of the most exclusive sections of town
__ 2. lived in a good section but not the best
__ 3. lived in an average section
__ 4. lived in one of the poorer sections of town
__ 5. lived in a rural area

Prior to going to college, you lived most of your life in:
__ 1. a large city (over 500,000)
__ 2. a city (20,000 to 500,000)
__ 3. a town (1,000 to 20,000)
__ 4. a village (less than 1,000)
__ 5. a rural area

Where have you lived most of your adult life?
__ 1. a large city (over 500,000)
__ 2. a city (20,000 to 500,000)
__ 3. a town (1,000 to 20,000)
__ 4. a village (less than 1,000)
__ 5. a rural area

How far did you go in school?
__ 1. took some college work, but didn't graduate
__ 2. graduated from college
__ 3. took some graduate work, but received no graduate degree
__ 4. completed M.S. or M.A.
__ 5. completed PhD

Which of your college courses was easiest for you?
__ 1. physical science, chemistry, physics, mathematics
__ 2. natural science, biology, zoology
__ 3. history, economics, civics
__ 4. commercial courses, bookkeeping, typing
__ 5. English, composition, speech

Which did you like best?
__ 1. physical science, chemistry, physics, mathematics
__ 2. natural science, biology, zoology
__ 3. history, economics, civics
__ 4. commercial courses, bookkeeping, typing
__ 5. English, composition, speech

Which was most difficult?
__ 1. physical science, chemistry, physics, mathematics
__ 2. natural science, biology, zoology
__ 3. history, economics, civics
__ 4. commercial courses, bookkeeping, typing
__ 5. English, composition, speech

Which did you like least?
__ 1. physical science, chemistry, physics, mathematics
__ 2. natural science, biology, zoology
__ 3. history, economics, civics
__ 4. commercial courses, bookkeeping, typing
__ 5. English, composition, speech

Check only one alternative

To what extent did your college education contribute to your life goals?
__ 1. it helped me markedly
__ 2. I believe it helped me somewhat
__ 3. I doubt that I would have done substantially differently if I had never attended college

Which one of the following had the greatest influence on you in determining your choice of a major field?
__ 1. possibility of high remuneration
__ 2. the value of the area to society
__ 3. the possibility of achieving personal satisfaction
__ 4. the possibility of achieving public acclaim
__ 5. the availability of a job after graduation
__ 6. none of these

How many times did you change your major in college?
__ 1. never
__ 2. once
__ 3. twice
__ 4. three or more times

Other than doing regular family chores, did you work while in high school?
__ 1. yes, paid my own expenses
__ 2. yes, earned some spending money
__ 3. no

What proportion of your college expenses did you earn personally?
__ 1. less than 1/10th
__ 2. 1/10th to 1/4th
__ 3. 1/4th to 1/2
__ 4. 1/2 to 3/4ths
__ 5. nearly all

In college, did you usually spend your leisure time
__ 1. reading scientific literature
__ 2. reading novels
__ 3. going to movies and dances
__ 4. participating in sports
__ 5. observing sports
__ 6. doing something else

How did your parents or guardian feel about your going on to college?
__ 1. urged and encouraged me
__ 2. supported me in my desire
__ 3. neither helped nor hindered me
__ 4. discouraged me somewhat--didn't think college was important
__ 5. put as many obstacles in my way as they could

How much better could you have done in college, scholastically, than you actually did?
__ 1. quite a bit better--I didn't apply myself
__ 2. a little better--I was not too serious
__ 3. not much better--I did about as well as my abilities permitted

Check only one alternative

When you were a college student, were you:
___ 1. more active and popular than most students
___ 2. about average
___ 3. not quite as active and popular as most students

If you could live the college years over, would you:
___ 1. choose the same curriculum at the same school
___ 2. choose the same curriculum in another school
___ 3. choose another curriculum at the same school
___ 4. choose another curriculum in another school
___ 5. not enter college

Has most of your adult life been spent working in the general area for which you were trained in college?
___ 1. Yes
___ 2. No

How did you feel about college?
___ 1. liked it very much
___ 2. liked it most of the time
___ 3. just accepted it as necessary
___ 4. was often unhappy with it
___ 5. cordially disliked it and was glad to finish

How much independence do you feel your parents allowed you while in high school?
___ 1. very little
___ 2. about as much as the rest of my friends
___ 3. quite lenient. A good deal
___ 4. as much as I wanted

During most of the time until you were 21, or until you left home, did you live in a place in which:
___ 1. I was well treated and happy
___ 2. I was fairly well treated and satisfied
___ 3. conditions were tolerable
___ 4. conditions were somewhat unsatisfactory
___ 5. I wanted to leave as soon as possible

During most of your school years your material needs were:
___ 1. well provided for
___ 2. satisfactorily provided for
___ 3. tolerably but meagerly provided for
___ 4. unsatisfied most of the time
___ 5. largely unsatisfied

How do you feel about the way you were disciplined as a child?
___ 1. it was fair but harsh
___ 2. it was fair and mild
___ 3. it was unfair and harsh
___ 4. it was often unfair, but it was mild
___ 5. it was mainly non-existent

Check only one alternative

While you were growing up did your parents entertain friends
__ 1. frequently
__ 2. fairly often
__ 3. occasionally
__ 4. almost never

How did you and your parents get along?
__ 1. very well; we agreed on almost everything
__ 2. better than most; we rarely had disagreements
__ 3. fairly well; as well as most
__ 4. not very well; we had many disagreements
__ 5. not at all; we almost never agreed

Using your own interpretation of what success means, do you feel your father was successful?
__ 1. yes
__ 2. partially
__ 3. no
__ 4. I am not sure

With which one of the following did your father help you most?
__ 1. learning to use tools or to enjoy hobbies
__ 2. learning to play baseball, football, or some other sport
__ 3. homework from school
__ 4. getting out of trouble
__ 5. none of these

As far as religion is concerned would you consider your parents during your childhood to have been:
__ 1. very religious
__ 2. moderately religious
__ 3. only nominally religious
__ 4. uncertain about the place of religion
__ 5. anti-religious

On the subject of your career, your parents:
__ 1. had very strong feelings and outlined what they wanted me to do
__ 2. were interested and helped me outline what I wanted to do
__ 3. were interested, but did not understand what I wanted to do
__ 4. actively opposed what I wanted to be
__ 5. showed little or no interest

How old were you when you were (first) married?
__ 1. less than 20 years old
__ 2. 20 to 22 years old
__ 3. 23 to 25 years old
__ 4. 26 to 30 years old
__ 5. over 31 years old
__ 6. never married

Check only one alternative

How often have you changed residences in the past 10 years?
___ 1. not at all
___ 2. once
___ 3. twice
___ 4. three times
___ 5. four or more times

During your adult life, have you entertained friends
___ 1. several times a week
___ 2. about once a week
___ 3. 2 or 3 times a month
___ 4. once a month
___ 5. a few times a year

At the present time do you: (Check one)
___ 1. own my own home or apartment
___ 2. rent a house
___ 3. rent an apartment
___ 4. live with relatives
___ 5. rent a room

Which best describes how your wife feels about your present living quarters?
___ 1. would like larger living quarters
___ 2. would like help with care of our living quarters
___ 3. satisfied with present living quarters
___ 4. would like to move to another neighborhood or community
___ 5. would like smaller living quarters
___ 6. not married, or wife deceased

How would you characterize your present home?
___ 1. extremely happy
___ 2. more happy than most
___ 3. about average
___ 4. a little less happy than the average
___ 5. extremely unhappy

With whom have you lived for most of the last ten years?
___ 1. alone
___ 2. with wife
___ 3. with child or children
___ 4. with other relatives
___ 5. with non-relatives

In regard to your home, who makes the decisions?
___ 1. my wife takes the most responsibility
___ 2. decisions are shared by my wife and me about equally
___ 3. I make most of the important decisions
___ 4. I am not married or wife is deceased

With regard to your career, does your wife
___ 1. do everything she can to further my career
___ 2. hinder me somewhat by the demands she makes
___ 3. hinder me a lot by her demands
___ 4. all things considered, neither hinder nor particularly help my career
___ 5. not married or wife deceased

Check only one alternative

Does your wife complain if you seem preoccupied with job problems while you are at home?

___ 1. I am frequently so preoccupied and she does complain
___ 2. I am frequently so preoccupied and she does not complain
___ 3. I am seldom preoccupied but she does complain when I am
___ 4. I am seldom preoccupied but she does not complain when I am
___ 5. I am never preoccupied at home with job problems
___ 6. not married or wife deceased

Which one of the following do you enjoy most?

___ 1. talking with friends
___ 2. spending time with my family
___ 3. physical activities
___ 4. meeting strangers and winning them over
___ 5. reading

Which one of the following do you enjoy least?

___ 1. talking with friends
___ 2. spending time with my family
___ 3. physical activity
___ 4. meeting strangers and winning them over
___ 5. reading

What is your attitude toward social gatherings?

___ 1. I enjoy them thoroughly
___ 2. I enjoy them if they are not too frequent
___ 3. I am somewhat indifferent to them
___ 4. I believe they are a waste of time, but I go occasionally
___ 5. I avoid them as completely as possible

Do you and your acquaintances generally agree on politics?

___ 1. yes, all of them feel as I do about politics
___ 2. I believe most of them feel as I do
___ 3. many of them feel as I do
___ 4. I believe most of them feel differently than I do
___ 5. I do not know how they feel about politics; we rarely discuss it

If you had a choice, would you prefer to associate socially with:

___ 1. men of my own age
___ 2. groups of mixed ages
___ 3. men older than myself
___ 4. men younger than myself
___ 5. have no preference

Which one of the following do you prefer? Consider that each may be presented through books, magazines, movies, stage plays, radio, TV, etc.

___ 1. mystery or detective stories
___ 2. current and political events
___ 3. historical novels or stories
___ 4. biography or autobiography
___ 5. science fiction
___ 6. humor

Check only one alternative

Which one of the following most nearly fits your pattern of reading?
___ 1. devote much time to reading of all kinds including that related to my work
___ 2. devote considerable time to reading in areas directly related to my work, but little time reading other things
___ 3. find that I have little time for reading although I read as much as I can
___ 4. read only the newspaper and an occasional magazine
___ 5. usually have more important things to do than read

To what extent do you read daily newspapers?
___ 1. read one or more newspapers thoroughly each day
___ 2. read parts of a newspaper each day
___ 3. read a newspaper two or three times per week
___ 4. seldom read a newspaper
___ 5. almost never read newspapers

How much time, on the average, do you spend reading journals, magazines, or books relating to your work?
___ 1. none
___ 2. less than 1 hour a week
___ 3. 1 to 3 hours a week
___ 4. 4 to 7 hours a week
___ 5. more than 7 hours a week

If you were at a "classical" music concert, what would be your usual reaction to the music? (Check one)
___ 1. think of other things most of the time, thus shutting the music out of my consciousness
___ 2. daydream a lot, the mood of my daydream being affected by the mood of the music
___ 3. respond emotionally to the mood of the music itself with very little or no daydreaming
___ 4. concentrate on the technical aspects of the music, listening for particular effects between instruments, etc.

Do you consider your reading speed to be:
___ 1. below average
___ 2. about average
___ 3. above average

Of the following, which one do you handle best?
___ 1. face-to-face interviews
___ 2. written reports
___ 3. group discussions or conferences
___ 4. lectures or speeches to groups
___ 5. getting my ideas across to my colleagues

Do you feel your major contribution to others has come through:
___ 1. family activities
___ 2. community activities
___ 3. job activities
___ 4. something else

Check only one alternative

As you have grown older have you:
___ 1. grown more confident of my own abilities
___ 2. come to have more respect for the abilities of others
___ 3. both 1 and 2
___ 4. neither 1 nor 2

I consider my achievements to date to have been:
___ 1. less than most who have the same amount of education
___ 2. equal to most who have the same amount of education
___ 3. more than most who have the same amount of education

When a man reaches age 65, he should: (Check one)
___ 1. retire but remain active by developing hobbies
___ 2. retire but remain as active as possible in the field of his past work
___ 3. continue working and thus stay active
___ 4. continue working only if he can't afford to retire
___ 5. retire only in case of ill health

Is your chief goal in life now the same as through most of your adult years?
___ 1. exactly the same
___ 2. somewhat changed
___ 3. completely changed

Which one of the following goals would you most like to reach during the next five years?
___ 1. to increase my income
___ 2. to feel more confident and secure about my abilities on the job
___ 3. to have a happy and serene home life
___ 4. to get more fun out of life
___ 5. to get along well without having to work as hard as in the past
___ 6. to make a significant contribution to science
___ 7. have no such definite or easily identified goals

Do you view retirement as a period during which you will have an opportunity to do whatever you have most wanted to do during your lifetime?
___ 1. Yes
___ 2. No

From your experience, at what stage in his life do you think the average man does his best work?
___ 1. when he is single
___ 2. when he is married, but childless
___ 3. when he is married and his family is young
___ 4. when he is married and his family is grown
___ 5. there are probably no differences among the above

Do you think that the period of your peak performance is:
___ 1. sometime in the past
___ 2. about now
___ 3. sometime in the future
___ 4. doubt there is a "peak period"
___ 5. can't be sure

Check only one alternative

How much of your time each week is devoted to religious activity?
___ 1. 0 to 1 hour
___ 2. 1 to 2 hours
___ 3. 2 to 4 hours
___ 4. 4 to 10 hours
___ 5. 10 or more hours

How many times have you seriously considered changing your religion?
___ 1. never
___ 2. once
___ 3. twice
___ 4. three or more times

As a young man, were you:
___ 1. a church member and engaged in church activities
___ 2. a nominal church member
___ 3. a 'religious rebel'
___ 4. a non-churchman without any great religious conviction
___ 5. none of the above

What part has religion played in the major decisions of your life (occupation, marriage, where you live, etc.)?
___ 1. it has been a major influence
___ 2. it has been a minor influence
___ 3. it has not been a conscious consideration

How do you regard religion?
___ 1. as a literal belief in the Bible
___ 2. as a guide for daily living
___ 3. as a statement of ethics which is valuable during the formative years
___ 4. outmoded by science, but comforting to some people
___ 5. I regard the church as a reputable social institution--neither better nor worse than many others
___ 6. none of the above represents my feeling

During the last 10 years do you consider that you have been:
___ 1. extremely religious
___ 2. moderately religious
___ 3. only nominally religious
___ 4. undecided about the place of religion
___ 5. without religion

As you have grown older have you become:
___ 1. more religious
___ 2. less religious
___ 3. largely unchanged in religious feeling

Where do you feel you have obtained your convictions about the meaning of life and how to live? (Check one)
___ 1. from my parents
___ 2. from discussions with close friends
___ 3. from reading
___ 4. from my own observation and meditation
___ 5. from a teacher, minister, or counsellor
___ 6. from another source

Check only one alternative

As an adult, which one of the following has seemed most important to you?

__ 1. a pleasant home and family-life
__ 2. a challenging and worthwhile job
__ 3. getting ahead in the world
__ 4. serving others
__ 5. enjoying life
__ 6. none of these

Which one of the following is currently least important to you?

__ 1. professional status, or authority
__ 2. money
__ 3. family and friends
__ 4. religion
__ 5. recreation

What do you consider to be the major motivating force in your life (Check one)

__ 1. desire for prestige
__ 2. desire for material wealth
__ 3. desire to come up with something new
__ 4. desire to gain a position of security
__ 5. desire to help others
__ 6. something else

What has your experience with people been?

__ 1. there is a lot of good in all people
__ 2. there is some good in most everyone
__ 3. people are about as good as they have to be
__ 4. a surprising number of people are mean and dishonest
__ 5. most people are just no good

Which one of these characteristics annoys you most in people you meet?

__ 1. bragging
__ 2. shyness
__ 3. lack of initiative
__ 4. trying to get something for nothing
__ 5. being very competitive
__ 6. lack of imagination
__ 7. repetitive "gabbling"

How do you usually behave in a group session with your associates?

__ 1. I feel free to express my views, and I sway the group considerably
__ 2. I feel free to express my views but the group doesn't always share them
__ 3. I am reluctant to express my views, but they are usually very well received
__ 4. I am reluctant to express my views and unsure of their reception
__ 5. I don't usually participate

In your relations with other people do you try to:

__ 1. please other people at any cost
__ 2. please other people if it doesn't go counter to my own feelings
__ 3. act according to my own feelings without regard to others' feelings

Check only one alternative

When your opinions differ from those of others, do you generally:
___ 1. keep them to myself
___ 2. express them to my associates
___ 3. express them regardless of the status of the person differing with me

When it is necessary for you to influence people to act, how do you do it?
___ 1. by setting an example
___ 2. by showing them how or what to do
___ 3. by asking them to do it
___ 4. by kidding them into doing it
___ 5. some other way

When someone borrows money from you and fails to pay you back, do you:
___ 1. ask them for it
___ 2. sometimes ask them for it, depending on the amount of money
___ 3. sometimes ask them for it, depending on who borrowed it and the amount of money
___ 4. seldom ask for it
___ 5. never ask for it
___ 6. don't lend money

At what age did you begin to smoke?
___ 1. 12 or younger
___ 2. 13 to 16
___ 3. 17 to 21
___ 4. 21 or over
___ 5. never smoked

At what age did you start drinking?
___ 1. 12 or younger
___ 2. 13 to 16
___ 3. 17 to 21
___ 4. 21 or over
___ 5. never drank

___ 5. never drank

At the present time, the amount of life insurance you hold on your own life is: (Check one)
___ 1. none
___ 2. less than $5000
___ 3. $5000 to $9900
___ 4. $10,000 to $24,000
___ 5. $25,000 to $50,000
___ 6. over $50,000

What part of your present income are you able to save or invest?
___ 1. less than 10%
___ 2. 10 - 20%
___ 3. 20 - 40%
___ 4. 40 - 50%
___ 5. more than 50%

Concerning your present and future activities, do you:
___ 1. make rather precise and detailed plans
___ 2. make broad and general plans, but not detailed ones
___ 3. make few plans, let "nature take its course"

Check only one alternative

Do you keep a personal budget and account of what you spend?
__ 1. keep exact records and budget all expenses
__ 2. keep exact records and manage the spending according to a general plan
__ 3. do not keep exact records, but do manage expenses according to a plan
__ 4. have tried keeping records or budgets, but have found them unnecessary
__ 5. have never found it necessary to keep exact records or budgets

How many times have you had an idea that you simply had to write down before you forgot it?
__ 1. never
__ 2. very few times
__ 3. several times
__ 4. many times

How have you reacted to the advantages and opportunities that have been presented to you?
__ 1. have taken advantage of almost every opportunity
__ 2. have usually tried to take advantage of any opportunity
__ 3. have taken advantage of some but not of others
__ 4. have not had too many opportunities but have taken advantage of those I have had
__ 5. have largely failed to take advantage of the few good opportunities I have had

Which one of the following do you think is closest to describing your own personality?
__ 1. difficult to really get to know
__ 2. have some really close friends and a number of acquaintances
__ 3. friendly and easy-going; have a lot of friends
__ 4. very jolly; the "life-of-the-party" type
__ 5. find it extremely difficult to describe myself

Which one of the following best describes you?
__ 1. socially introverted - not a joiner
__ 2. a dreamer - would rather speculate than plunge into action
__ 3. unconventional - not much influenced by precedent
__ 4. physically lazy - intrigued with all labor saving devices and techniques
__ 5. dislikes routine or detailed work

Which one of the following least describes you?
__ 1. socially introverted - not a joiner
__ 2. a dreamer - would rather speculate than plunge into action
__ 3. unconventional - not much influenced by precedence
__ 4. physically lazy - intrigued with all labor saving devices an techniques
__ 5. dislikes routine or detailed work

Do you consider yourself a: (Check one)
__ 1. nervous person
__ 2. fairly tense person
__ 3. fairly relaxed person, except when job tensions build up
__ 4. fairly relaxed person
__ 5. relaxed person

Check only one alternative

How do you tend to react to an unpleasant situation? (Check one)
___ 1. I generally try to figure out the best solution and react immediately
___ 2. most of the time I put off a decision so I can think it over
___ 3. often I want to sleep on it or put off a decision for quite awhile
___ 4. I don't worry about it, things will take care of themselves

When you have restless nights what is the most common reason? (Check one)
___ 1. work problems
___ 2. family or personal problems
___ 3. financial worries
___ 4. not feeling well physically
___ 5. something else

What period of your life do you remember as your happiest?
___ 1. early childhood
___ 2. school years
___ 3. college years
___ 4. time in the armed forces
___ 5. early working years
___ 6. middle working years
___ 7. recent past

What period do you remember as least happy?
___ 1. early childhood
___ 2. school years
___ 3. college years
___ 4. time in the armed forces
___ 5. early working years
___ 6. middle working years
___ 7. recent past

As a youngster, how did you act when you got angry?
___ 1. threw a tantrum or got into a fight?
___ 2. went off by myself
___ 3. tried to hide my feelings
___ 4. none of the above

Have you often desired something so much you would do almost anything for it
___ 1. never
___ 2. once
___ 3. twice
___ 4. three or more times

When you are tired how do you act? (Check one)
___ 1. just sleepy
___ 2. short tempered and "jumpy"
___ 3. " punchy" - "slap happy"
___ 4. unhappy
___ 5. mean
___ 6. some other way

Check only one alternative

Looking back on your life, up through adolescence, which one of the following best described you?

___ 1. lonely and troubled
___ 2. happy and carefree
___ 3. filled with curiosity
___ 4. tough and indifferent
___ 5. given to emotional extremes of joy and sorrow

When you are reading and come across a word you do not know, do you:

___ 1. keep right on reading
___ 2. immediately look it up in the dictionary
___ 3. sometimes look it up depending on the context in which it is used
___ 4. make a mental note to look the word up at a later date

How often do you tell jokes?

___ 1. very frequently
___ 2. frequently
___ 3. occasionally
___ 4. seldom
___ 5. can't remember jokes

Which one of the following do you find most annoying?

___ 1. inability to remember names
___ 2. distractability
___ 3. irritability
___ 4. tendency to "day dream"
___ 5. tendency to worry
___ 6. inability to accomplish as much as I used to

How well do you do most things you have decided to do?

___ 1. almost always succeed in the things I attempt and do them better than most people could
___ 2. find that I do most things as well as other people do
___ 3. usually get the things done that I attempt but seldom do them as well as I want to

___ 3. usually get the things done that I attempt but seldom do them as well as I want to

___ 4. often find I have bitten off more than I can chew and have to give up

How fast do you usually work?

___ 1. much faster than most people
___ 2. somewhat faster than most people
___ 3. about the same speed as most other people
___ 4. somewhat slower than most people
___ 5. much slower than most people

How greatly disturbed are you if something is left unfinished?

___ 1. slightly
___ 2. moderately
___ 3. considerably
___ 4. highly

Check only one alternative

Do most people give you:
___ 1. much more respect than I deserve
___ 2. a little more respect than I deserve
___ 3. as much respect as I deserve
___ 4. a little less respect than I deserve
___ 5. a lot less respect than I deserve

As a boy, or young man, do you think you were most often regarded as: (Check one)
___ 1. unduly sensitive
___ 2. over-confident (cocky)
___ 3. radical or unconventional
___ 4. physically (but not mentally) lazy
___ 5. introverted

As a boy, or young man, do you think you were least often regarded as: (Check one)
___ 1. unduly sensitive
___ 2. over-confident (cocky)
___ 3. radical or unconventional
___ 4. physically (but not mentally) lazy
___ 5. introverted

Do you think your friends have generally considered you:
___ 1. quite curious about the world around me
___ 2. moderately curious
___ 3. quite indifferent

In which of the following settings did your most outstanding negative experience occur?
___ 1. family setting
___ 2. classroom or school
___ 3. social situation
___ 4. religious

How often do you feel dissatisfied with yourself?
___ 1. frequently
___ 2. occasionally
___ 2. occasionally
___ 3. rarely
___ 4. hardly ever

About how many motion pictures have you attended during the past year? (Or a typical year)
___ 1. 0
___ 2. 1 or 2
___ 3. 3 to 10
___ 4. 11 to 20
___ 5. 21 or more

Which one of the following types of radio or TV programs do you like best?
___ 1. news or sports events
___ 2. operas, symphonies, or concerts
___ 3. comedy or variety programs
___ 4. mystery plays
___ 5. practically never listen to the radio or view TV

Check only one alternative

About how often do you spend an evening at home in leisurely reading?
__ 1. practically never
__ 2. occasionally
__ 3. frequently

What type of book do you prefer to read for pleasure?
__ 1. novels
__ 2. technical books
__ 3. mystery stories
__ 4. biography and history
__ 5. literary classics

How do you generally prefer to spend your vacations?
__ 1. hunting, fishing, or camping (roughing it)
__ 2. traveling
__ 3. at some comfortable resort
__ 4. at home, getting caught up on back work
__ 5. at home resting, or working with my hobby
__ 6. some other way

Which one of the following do you look forward to most in your leisure-time activities?
__ 1. a chance to be alone with my thoughts
__ 2. a chance to rest and relax
__ 3. a chance to putter around
__ 4. a chance to be with other people
__ 5. a chance to get outdoors or be active

About how often do you and your wife go out together for an evening?
__ 1. once a month or less
__ 2. 2 to 3 times a month
__ 3. once a week
__ 4. more often than once a week

To how many clubs or fraternal organizations do you belong?
__ 1. none
__ 2. one
__ 3. two
__ 4. three
__ 5. four or more

As you were growing up, were you:
part of "the gang" ____ often alone ____

As a youngster, did you have real affection for your parent(s)?
yes ____ no ____

Do you lead a fairly solitary life?
yes ____ no ____

Generally speaking, do you enjoy life and find it satisfying?
yes ____ no ____

Are you finding it possible to "gracefully withdraw" from the pressure of numerous activities?
yes ____ no ____

Which is more important to you?
comfort and convenience ____ some new experience ____

Do you have some positive and satisfying philosophy about life and its purpose?
yes ____ no ____

Has your sexual behavior or attitude undergone any marked change during the last 10 years?
yes ____ no ____

Have you suffered any great personal tragedy in the last ten years?
yes ____ no ____

Is your vision still adequately correctable with glasses?
yes ____ no ____

Do you find it easier to make up your mind than you used to?
yes ____ no ____

Do you feel that you "know yourself" - both your assets and your limitations-better than you did ten years ago?
yes ____ no ____

Do you keep fairly close track of current events?
yes ____ no ____

Do you find that your memory is better for events that occurred some years ago than for recent events?
yes ____ no ____

Do you find that your memory is:
definitely poorer than it used to be ____
slightly, if at all, poorer than it used to be ____

Is your writing as legible as it was 10 years ago?
yes ____ no ____

Do you read extensively?
yes ____ no ____

Part III

Multiple Choice Questions

Check all alternatives that apply

Recalling how you were reared, in what regard did you try to raise your child, or children, differently? (Check all that apply)

___ 1. was less strict in disciplining them
___ 2. was more frank and open about matters of sex
___ 3. permitted them more independence
___ 4. showed more affection for them
___ 5. didn't do differently; tried to do as well as my parents did

In what way have you done more for your children than your father did for you? (Check all that apply)

___ 1. gave them a better standard of living (clothes, food, home)
___ 2. gave them opportunity to study art, music, literature, and other leisure-time activities
___ 3. gave them more financial support to get established in a business or profession
___ 4. gave them more affection and consideration as individuals
___ 5. something else
___ 6. tried to give them everything my father gave me

From what sources was your education financed? (Check all that apply)

___ 1. scholarship(s) (service-free)
___ 2. assistantship(s) (service rendered)
___ 3. veterans benefits
___ 4. part-time or full-time job(s)
___ 5. family, relatives or friends
___ 6. a formal loan
___ 7. other

Which of the following kinds of foods form a larger proportion of your diet now than 10 years ago? (Check all that apply)

___ 1. fatty foods (fats and oils)
___ 2. starchy foods
___ 3. lean meat
___ 4. salads
___ 5. cooked vegetables
___ 6. fruits
___ 7. dairy products
___ 8. diet is unchanged

With respect to work habits, do you: (Check all that apply)

___ 1. work best on a regular schedule
___ 2. work best under pressure
___ 3. work effectively only when I am "in the mood"
___ 4. sometimes make notes in the middle of the night
___ 5. have a regular series of steps I follow in attempting to solve a problem

Check all alternatives that apply

Check the items which have helped you to gain what you most want out of life: (Check all that apply)

___ 1. my job
___ 2. my religious beliefs
___ 3. my education
___ 4. the community surroundings
___ 5. my home conditions
___ 6. none of the above

Which of the following do you smoke? (Check all that apply)

___ 1. cigarettes
___ 2. pipe
___ 3. cigars
___ 4. don't smoke

When you need to solve a tough problem relating to your work, what do you usually do? (Check all that apply)

___ 1. sit down and figure it out myself
___ 2. talk it over with my wife or friends
___ 3. talk it over with some of the fellows at work
___ 4. talk it over with my boss or other superiors
___ 5. let it ride for awhile, then tackle it with a fresh eye

What were the primary reasons for your selection of your first full time "permanent" job? (Check all that apply)

___ 1. good pay
___ 2. good opportunity for advancement
___ 3. because it was challenging
___ 4. because it was within my field of interest
___ 5. as a stop-gap because I needed a job
___ 6. as a temporary job which would be good training for another type of job

Have you ever suffered from: (Check all that apply)

___ 1. allergies
___ 2. asthma
___ 3. high blood pressure
___ 4. ulcers
___ 5. headaches
___ 6. some other chronic condition
___ 7. none of these

What have you done during the past year to maintain your health? (Check all that apply)

___ 1. visited the doctor regularly
___ 2. gotten plenty of sleep and fresh air
___ 3. refrained from overeating
___ 4. stopped worrying
___ 5. didn't do anything in particular

check all alternatives that apply

Would you like to relive any parts of your childhood or youth? (Check all that apply)

___ 1. would enjoy reliving the time when I used to date
___ 2. would like to relive the time before I started going to school
___ 3. would like to relive the time when I was in school
___ 4. childhood was fine, but reliving it doesn't interest me
___ 5. dislike thinking much about my childhood

In which of the following do you now participate? (Check all that apply)

___ 1. hunting or fishing
___ 2. hiking or skating
___ 3. swimming or boating
___ 4. tennis or golf
___ 5. bowling
___ 6. volleyball, handball, squash, etc.
___ 7. some other

To which of the following activities (aside from work) have you devoted considerable time during the past 5 years? (Check all that apply)

___ 1. loafing or watching television
___ 2. amusements outside my home
___ 3. outdoor recreation (hiking, fishing, swimming, golf, etc.)
___ 4. outdoor work around the house (gardening, painting, etc.)
___ 5. reading
___ 6. music, art, dramatics
___ 7. club activities (fraternal, civic, fund-raising, etc.)
___ 8. minor repairs inside the house
___ 9. hobbies (collecting stamps or coins, photography, etc.)
___10. something else

Which magazines do you subscribe to or read regularly? (Check all that apply)

___ 1. Time, Newsweek, or U. S. News
___ 2. Life or Look
___ 3. Fortune
___ 4. Harpers or Atlantic
___ 5. Home craft magazines, as Popular Mechanics, Popular Science, etc.
___ 6. Sports and outdoor magazines
___ 7. Reader's Digest or Saturday Evening Post
___ 8. Home magazines (Better Homes & Gardens, House & Gardens, etc.)
___ 9. Women's magazines (Good Housekeeping, etc.)
___10. Travel magazines
___11. Scientific American or National Geographic
___12. none of the above

To which of the following do you expect to devote most time when you retire?

___ 1. loafing or watching television (Check all that apply)
___ 2. amusements outside my home (movies, etc.)
___ 3. outdoor recreation (hiking, fishing, swimming, golf, etc.)
___ 4. outdoor work around the house (gardening, painting, etc.)
___ 5. reading
___ 6. music, art, literature
___ 7. club activities (fraternal, fund raising, etc.)
___ 8. minor repairs inside the house
___ 9. hobbies (collecting coins, photography, etc.)
___10. something else
___11. haven't thought about it
___12. don't plan to retire

Part IV

"Fill-in" Responses

Fill in Answers to the Following Items

1. What is your present age? ________ Years ________ Months

2. With how many brothers and sisters did you grow up? __________

3. Exact title of present occupational position and a brief description of your duties.
____
____

4. In what curriculum was your undergraduate major? ______________

5. In how many social welfare activities are you actively engaged? ________

6. What was your approximate income for 1960? Salary and earnings $________
Other sources $________

7. For how many days, during the last full calendar year, have your normal activities been suspended because of illness? ______
because of accident? ______

8. Give a brief description of other full time positions you have held for a period of 5 years or more. (Start with the most recent and work backwards)

Years Employed
a. ______________________________ 19___ to 19___
b. ______________________________ 19___ to 19___
c. ______________________________ 19___ to 19___
d. ______________________________ 19___ to 19___
e. ______________________________ 19___ to 19___

9. If deceased, at about what age did your parents die? Mother ____ Father ____

To the best of your knowledge, of what did they die?

Mother ______________________________

Father ______________________________

10. How is your day divided, on the average?
Sleep = ____ hours
Work = ____ hours
Recreation = ____ hours

11. Do you wish your Army Alpha test results sent to you? Yes____ No____

APPENDIX B

INSTRUCTIONS TO EXAMINERS

INSTRUCTIONS TO EXAMINERS

1. GENERAL INSTRUCTIONS

a. Purpose of the Examination and Life Experience Inventory. These subjects you are retesting have already taken Army Alpha on two previous occasions; once in 1919-20 as entering freshmen at Iowa State, and again in 1950, under conditions like the present ones. Their overall scores on the second testing were higher than on the first. Our purpose now is to determine the effect of the last, critical 11 years on this test performance and, through the "Life Experience Inventory," to identify some of the variables associated with shifts in score.

b. General Procedure. It is our plan to have you contact the individual(s) whose name(s) is (are) enclosed and to arrange for a retesting as soon as possible. Each person has already indicated willingness to cooperate.

When the subject has completed the Alpha exam and the inventory, in accordance with the instructions which follow, please enclose all the materials in the self-addressed envelope and mail it. If we have overlooked something so that you feel it is imperative to contact us, phone collect for Dr. William A. Owens, Department of Psychology, Purdue University, West Lafayette, Indiana (Phone 92-2752; Account # 0476-63-831).

c. General Directions for Administration.

(1) We have no way of identifying the individual who took this test and inventory except by serial number! It is therefore imperative that you give the examination and Life Experience Inventory, with a particular number, to a particular subject! You will find the name and corresponding number on the enclosed 3" x 5" note card. This same number is in the upper left-hand corner on both the examination and the inventory.

(2) First, administer the Army Alpha Examination in strict accordance with the standard instructions. These were reproduced from the original Examiners Guide of 1917 and have been clipped to the Alpha exam(s) in your packet. If you are not familiar with the administration of Alpha, please go through the directions with particular care, take the exam yourself, or otherwise become familiar with it. When the "regular administration" has been completed, proceed immediately with the "overtime administration." Instructions for it follow the standard instructions.

(3) Next have the subject complete the Life Experience Inventory in accordance with the instructions clipped to it.

(4) Following our receipt of the test results, it will take about 10 days for us to have payments processed through the Business Office, at the end of which time we will mail a check, for services rendered, to you and to each subject tested.

INSTRUCTIONS TO EXAMINERS

2. INSTRUCTIONS, ARMY ALPHA EXAMINATION

Read the subject the following:

"You will be administered the Army Alpha Examination and a multiple choice-type Life Experience Inventory, in this order.

The general purpose of the exam is to see how well you can remember, think and carry out instructions when you are told to do so. It is the same exam you repeated some 10 years ago and took originally when you were a freshman at Iowa State University. Do not fill in your name or the other information suggested at the top of the first page. The number in the upper left-hand corner identifies your blank; you will never be identified by name. Are there any questions?"

(Note to Examiner. If you do not have a stop watch or timer to use, it is strongly recommended that you start each time period with the second hand on your watch at 60.)

When everything is ready, proceed with the standard instructions below.

"Listen carefully. Do not ask questions. Look at your papers. At the top of the page there are several sets of forms--circles, triangles, and so forth. First you will be told to do something with the circles at 1, afterwards with the circles at 2, and so on.

"When I call 'Attention,' stop instantly whatever you are doing and hold your pencil up--so. Don't put your pencil down to the paper until I say 'Go.' (Examiner lowers his pencil.) Listen carefully to what I say. Do just what you are told to do. As soon as you are through, pencils up. Remember, wait for the word 'Go.'"

Note to Examiner. Give the following instructions very distinctly and at moderate speed. After giving the command, "Attention," always notice carefully whether all pencils are up. Never proceed until they are. This is especially important in the beginning. Be careful not to pause or to drop your voice in the course of a compound direction, e.g., in 2, before the words "and also." Raise your pencil whenever you say, "Attention." Lower it promptly whenever you say, "Go."

Test 1, Form 6

1. "Attention! 'Attention' always means 'Pencils up.' Look at circles at 1. When I say 'go' but not before, make a cross in the second circle and also a figure 1 in the third circle.--Go!" (Allow not over 5 seconds.)

2. "Attention! Look at 2, where the circles have numbers in them. When I say 'go' draw a line from Circle 2 to Circle 5 that will pass above Circle 3 and below Circle 4--Go!" (Allow not over 5 seconds.)

3. "Attention! Look at the square and triangle at 3. When I say 'go' make a cross in the space which is in the square but not in the triangle and also make a figure 1 in the space which is in the triangle and in the square.--Go!" (Allow not over 10 seconds.)

4. "Attention! Look at 4. When I say 'go' make a figure 1 in the space which is in the triangle but not in the circle or square, and also make a figure 2 in the space which is in the square and circle, but not in the triangle.--Go!" (Allow not over 10 seconds.)

(Note to Examiner. In reading 5, don't pause at the word CIRCLE as if ending a sentence.)

5. "Attention! Look at 5. If a regiment is bigger than a company, then (when I say 'go') put a cross in the first circle; if not, draw a line under the word NO.--Go!" (Allow not over 10 seconds.)

6. "Attention! Look at 6. When I say 'go' put in the second circle the right answer to the question: 'How many months has a year?' In the fourth circle do nothing, but in the fifth circle put any number that is a wrong answer to the question that you just answered correctly.--Go!" (Allow not over 10 seconds.)

7. "Attention! Look at 7. When I say 'go' cross out the letter just before D and also draw a line under the second letter before I.--Go!" (Allow not over 10 seconds.)

8. "Attention! Look at 8. Notice the three circles and the three words. When I say 'go' make in the first circle the last letter of the first word; in the second circle the last letter of the second word and in the third circle the third letter of the third word.--Go!" (Allow not over 10 seconds.)

9. "Attention! Look at 9. When I say 'go' cross out each number that is more than 30 but less than 40.--Go!" (Allow not over 15 seconds.)

10. "Attention! Look at 10. Notice that the drawing is divided into five parts. When I say 'go' put a 3 or a 2 in each of the two smallest parts and any number between 4 and 7 in the part next in size to the largest part.--Go!" (Allow not over 15 seconds.)

11. "Attention! Look at 11. When I say 'go' draw a line through every odd number that is not in a circle and also through every odd number that is in a circle with a letter.--Go!" (Allow not over 25 seconds.)

12. "Attention! Look at 12. If 6 is more than 4, then (when I say 'go') cross out the number 5 unless 5 is more than 7, in which case draw a line under the number 6.--Go!" (Allow not over 10 seconds.)

"During the rest of this examination don't turn any page forward or backward unless you are told to. Now turn over the page to Test 1."

Test 2, Arithmetical Problems

"Attention! Look at the directions at the top of the page while I read them. 'Get the answers to these examples as quickly as you can. Use the side of this page to figure on if you need to.' I will say stop at the end of five minutes. You may not be able to finish all of them, but do as many as you can in the time allowed. The two samples are already answered correctly.--Ready--Go!"

After 5 minutes, say "STOP! Turn over the page to Test 3."

Test 3, Practical Judgment

"Attention! Look at the directions at the top of the page while I read them.

"This is a test of common sense. Below are sixteen questions. Three answers are given to each question. You are to look at the answers carefully; then make a cross in the square before the best answer to each question, as in the sample:

"Why do we use stoves? Because

they look well

X they keep us warm

they are black.

"Here the second answer is the best one and is marked with a cross.

"Begin with No. 1 and keep on until time is called.--Ready--Go!"

After 1½ minutes, say "STOP! Turn over the page to Test 4."

Test 4, Synonym-Antonym

"Attention! Look at the directions at the top of the page while I read them." (E. reads slowly.)

"'If the two words of a pair mean the same or nearly the same draw a line under same. If they mean the opposite or nearly the opposite, draw a line under opposite. If you can not be sure, guess. The two samples are already marked as they should be.' --Ready--Go!"

After 1½ minutes, say "STOP! Turn over the page to Test 5."

(Pause.) "Now you have to turn your books around this way."

(Examiner illustrates the necessary rotation.)

Test 5, Disarranged Sentences

"Attention! Look at the directions at the top of the page while I read them." (E. reads slowly.)

"'The words a eats cow grass in that order are mixed up and don't make a sentence; but they would make a sentence if put in the right order: a cow eats grass, and this statement is true.

"Again, the words horses feathers have all would make a sentence if put in the order all horses have feathers but this statement is false.

"Below are 24 mixed-up sentences. Some of them are true and some are false. When I say 'go,' take these sentences one at a time. Think what each would say if the words were straightened out, but don't write them yourself. Them, if what it would say is false, draw a line under the word 'false;' if what it would say is true, draw a line under the word 'true.' If you can not be sure, guess. The two samples are already marked as they should be. Begin with No. 1 and work right down the page until time is called.' --Ready--Go!"

After 2 minutes, say, "STOP! Turn over the pageto Test 6."

Test 6, Number Series Completion

(Note to Examiner: Give these instructions very slowly.)

"Attention! Look at the first sample row of figures at the top of the page - 2, 4, 6, 8, 10, 12; the two numbers that should come next are, of course, 14, 16.

"Look at the second sample - 9, 8, 7, 6, 5, 4; the two numbers that should come next are 3, 2.

"Look at the third sample - 2, 2, 3, 3, 4, 4; the two numbers that should come next are 5, 5.

"Now look at the fourth sample - 1, 7, 2, 7, 3, 7; the next two numbers would, of course, be 4, 7.

"Look at each row of numbers below, and on the two dotted lines write the two numbers that should come next.--Ready--Go!"

After 3 minutes, say, "STOP! Turn over the page to Test 7."

Test 7, Analogies

"Attention! Look at the first sample at the top of the page: Sky - blue : : grass - table, green, warm, big.

"Notice the four words in heavy type. One of them - green - is underlined. Grass is green just as the sky is blue.

"Look at the second sample: Fish - swims : : man - paper, time, walks, girl.

"Here the word walks is underlined. A man walks and a fish swims.

"Look at the third sample: Day - night : : white - red, black, clear, pure.

"Here the word black is underlined because black is the opposite of white just as night is the opposite of day.

"In each of the lines below the first two words are related to each other in some way. What you are to do in each line is to see what the relation is between the first two words, and underline the word in heavy type that is related in the same way to the third word. Begin with No. 1 and mark as many sets as you can before time is called.--Ready--Go!"

After 3 minutes, say, "STOP! Turn over the page to Test 8."

Test 8, Information

"Attention! Look at the directions at the top of the page while I read them." (E. reads slowly.)

"'Notice the sample sentence: People hear with the - eyes - ears - nose - mouth. The correct word is ears, because it makes the truest sentence. In each of the sentences below you have four choices for the last word. Only one of them is correct. In each sentence draw a line under the one of these four words which makes the truest sentence. If you can not be sure, guess. The two samples are already marked as they should be.'--Ready--Go!"

After 4 minutes, say, "STOP! Turn over the page to Test 1 again."

Overtime administration:

We would like to know how much of an age decrement (if we find one) to attribute to a loss in speed. Therefore, when the subject has completed all subtests according to the standard directions above, substitute for the black lead pencil which he has been using the red pencil enclosed with the test materials. Now allow him to complete, in order, any subtest which he has not previously finished. At a maximum, allow him for the completion of such subtest no more time than the standard time initially granted. You may repeat the instructions for the subtest in question if the examinee needs, or requests you to do so. No answer originally made during the standard administration should be changed or altered in any way, during the overtime period.

Observations:

Please record any pertinent comments or observations of the subject that may indicate his reactions toward the experience of taking the examination.

INSTRUCTIONS TO EXAMINERS

3. INSTRUCTIONS, LIFE EXPERIENCE INVENTORY

Please check to be sure that the serial number on the inventory corresponds with the serial number on the subject's identification card!

We feel the subject should be able to complete the inventory without assistance but we would like to have you acquaint yourself with it beforehand.

The items of the inventory are arranged by "response type" to facilitate their completion. The parts or sections should be covered in the order in which they are assembled. Instruct the subjects to mark his choices with an X. You may assure the subject that, although the booklet is thick, the number of items is not prohibitive and may largely explain any shifts in his test score since 1950. There is no time limit on the inventory.

When the subject has completed it, please check the following:

1. Have all items been answered?

2. Has one and only one alternative been checked on the items in Part II?

3. Has the subject understood that all alternatives that apply were to be checked in Part III?

Please record any comments or remarks made by the subject regarding the inventory and also the amount of time he spent completing it.

APPENDIX C

TABLES FROM 1953 GENETIC PSYCHOLOGY MONOGRAPH, "AGE AND MENTAL ABILITIES"

Table 35

Temporal Shifts in Sub-Test and Total Alpha Scores

Content	$Mn_{'50}-Mn_{'19}$	"t"
1. Following Directions	0.042	0.43
2. Arithmetical Problems	-0.101	-1.53
3. Practical Judgment	0.542	8.22**
4. Synonym-Antonym	0.549	8.26**
5. Disarranged Sentences	0.633	7.29**
6. Number Series Completion	0.001	0.01
7. Analogies	0.143	2.02*
8. Information	0.931	17.44**
Total Score	0.550	11.17**

Norm Mn = 5 & σ = 1.

** = $P<.01$; * = $P<.05$.

Table 36

Temporal Shifts in Component Alpha Scores

Component	$\overline{X}_{1950}-\overline{X}_{1919}$	"t"
Verbal	.681	14.06**
Numerical	-.059	-.90
Reasoning	.150	2.17*

Norm Mean = 5; Standard Deviation = 1.

** = $P < .01$; * = $P < .05$.

Table 37

The Effects of Age upon Individual Differences

Content	1919 σ^2	1950 σ^2	t
1. Following Directions	0.7972	0.8433	0.329
2. Arithmetical Problems	0.8071	0.9211	1.027
3. Practical Judgment	0.6483	0.5976	-0.550
4. Synonym-Antonym	0.7900	0.7530	-0.349
5. Disarranged Sentences	1.1155	0.6827	-3.164**
6. Number Series Completion	0.8559	0.6986	-1.451
7. Analogies	0.5149	0.8697	3.569**
8. Information	0.5177	0.4479	-1.040
Total Score	0.5890	0.7431	2.055*

** = $P < .01$; * = $P < .05$.

Table 38

The Effects of Age upon Trait Differences

Sub-Tests	$\Sigma(\sigma^2\,'50-\sigma^2\,'19)$	Range	N±	t	P
1 through 8	0.2303	+2.8869 -1.4513	+63 -64	0.033	$>.05$

σ^2 '50 = the variance of the individual's sub-test scores in 1950.

Range = greatest individual increase and decrease in σ units.

N± = number of cases showing an increase or decrease.

APPENDIX D

MORE PROMISING NONCONTINUUM LIFE HISTORY ITEMS

Table 39

Responses of High Criterion Individuals to Significant Noncontinuous Life History Items

		Probabilities	
Item and Alternative #	Item Stem and Alternative	1919 to 1950	1950 to 1961
12	On which one of the following features of your job would you like to be able to spend more time?		
-4	getting to really know the people with whom I work		02 N
16	In your previous job(s) about how much time did you spend with people higher up in the company or organization?		
-2	1/4 to 1/2	01 T	
17	Which item best describes the routine paper work of your past jobs?		
-3	a lot, but most of it was really necessary	03 R	
19	In your organization, which one of these applies most?		
-5	there are too many people just interested in their own individual advancement.		05 V 05 T
21	In connection with your work, in which one of these have you taken most pride?		
-5	having been able to do well whatever management has requested.	02 T	
25	Which college courses did you like best?		
-3	history, economics, civics	04 V	
54	Which one of the following is currently least important to you?		
-2	money		01 R
-5	recreation	03 T	

(Table continued on next page)

Table 39 (Continued)

Responses of High Criterion Individuals to Significant Noncontinuous Life History Items

Item and Alternative #		Item Stem and Alternative	Probabilities 1919 to 1950	Probabilities 1950 to 1961
56		Which one of these characteristics annoys you most in people you meet?		
	-3	lack of initiative	01 R	
63		When you have restless nights what is the most common reason? (Check one)		
	-4	not feeling well physically	02 T	
84		What were the primary reasons for your selection of your first full time "permanent job"? (Check all that apply)		
	-6	as a temporary job which would be good training for another type job		02 T 02 V
88		In which of the following do you now participate? (Check all that apply)		
	-4	tennis or golf		04 N
94		Cause of mother's death		
	-6	mother still living	01 V	

Table 40

Responses of Low Criterion Individuals to Significant Noncontinuous Life History Items

Item and Alternative #		Item Stem and Alternative	Probabilities 1919 to 1950	1950 to 1961
3		Have you ever been hospitalized more than one week as the result of any kind of accident?		
	-1	yes	04 R	
11		What is most important to you in a job?		
	-3	that the working situation be pleasant from day to day	04 R	
13		What is the most important characteristic of jobs you have liked?		
	-4	the security the job gave me	05 R 05 T	
21		In connection with your work, in which one of these have you taken most pride?		
	-1	having been able to avoid any major controversies	03 T	
27		Which college courses did you like least?		
	-1	physical science, chemistry, physics, mathematics	03 N	
38		Which one of the following do you enjoy most?		
	-2	spending time with my family		01 R
41		If you had a choice, would you prefer to associate socially with:		
	-4	men younger than myself	02 N	
47		Do you view retirement as a period during which you will have an opportunity to do whatever you have most wanted to do during your lifetime?		
	-2	no		03 V

(Table continued on next page)

Table 40 (Continued)

Responses of Low Criterion Individuals to Significant Noncontinuous Life History Items

Item and Alternative #	Item Stem and Alternative	Probabilities 1919 to 1950	1950 to 1961
58	When someone borrows money from you and fails to pay you back, do you?		
-1	ask them for it		04 R
61	Which one of the following best describes you?		
-3	unconventional--not much influenced by precedent	05 N	
71	In which one of the following settings did your most outstanding negative experience occur?		
-1	family setting		03 N
-2	classroom or school	02 N	
-4	religious	02 R	
91	To which of the following do you expect to devote most time when you retire? (Check all that apply)		
-6	music, art, literature		02 R
94	Cause of mother's death		
-2	cancer	01 T	